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Original Articles

Latent Evils in Congenitally Deformed Middle Turbinals, Later Manifested When Supplemented by a Focus of Chronic Infection*

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The purpose of this paper will be to submit the proposition that in the existence of a certain type of abnormal middle turbinals rests a latent noxious influence, which when supplemented by the intermediate influence of a focus of chronic infection (most frequently located in the faucial tonsils) may become a potent etiological and perpetuating influence upon a group of common diseases.

The grounds upon which my deductions are based are largely clinical; and while the evidence herein cited cannot be regarded as conclusive, yet when a certain pathology, not merely of function but also of definite anatomic lesions, is observed to coexist in a high degree of uniformity with certain related disorders, and that the manifestations of those disorders are favorably influenced in a fair measure by the removal of the specified lesions, the stated hypothesis seems not without a fair measure of justification. That the etiologic agency concerned is of a twofold nature is substantiated both by the observed incomplete development of the characteristic symptom-complex where only one factor exists, and by the increased relief resulting from the removal of both factors over that of only one. It is believed that the primary element in the dual pathology is distinctly the hyperplastic middle turbinal, which abnormality occurs neither by chance nor from injury, but represents a developmental deviation consistent with recognized laws of heredity.

Upon this principle, it is believed, will be found a rational and tangible basis upon which to account for the hereditary phase recognized as more or less characteristic. In other words, abnormality of structure may appear through successive generations with the same degree of conformity to type, in accordance with certain laws of heredity. The symptomatology depends upon the degree of abnormality, plus certain intermediate or associated influences, which together establish its measure of pathogenicity. This belief is based upon the high degree of consistency with which the specified anatomic lesion has been found associated with a large number of diseases, manifesting a more or less analogous syndrome, differing largely in matter of degree, and showing a tendency to appear in certain families from generation to generation, with the added evidence of the uniformity with which the development, progress, or existence of the syn-

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drome has been relieved or modified by the surgical elimination of those lesions.

The phase of hereditary influence will be elaborated in a later subdivision of the paper, but at this stage of the discussion it is deemed more important, first, to make clear the identity of the particular type of turbinal malformation with which my hypothesis is concerned. In the majority of cases it will be found to be a unilateral hyperplasia of the body of the turbinal structure, with a corresponding deflection of that portion of the nasal septum directly opposite, and a correlative underdevelopment of the opposite middle turbinal. The typical septal deflection concerned in this process involves essentially the perpendicular plate of the ethmoid, and when it is taken into account that all of these structures, the perpendicular plate and the two turbinals, are continuous parts or divisions of a definite unit, the ethmoid structure, and not separate and distinct units in themselves, the whole abnormality can be conceived as an embryologic deviation from the normal. That is, the relative sizes of the turbinals and the position of the septum, being purely an adaptive conformation, are fixed wholly by heredity. I therefore do not concur in the opinion sometimes advanced in explanation of these abnormalities to the effect that the deflection of the septum is the result of pressure exerted by an overdeveloped turbinal; nor, conversely, that the deflected septum by pressure against the turbinal on the side of its convexity produces an atrophy of that structure, while the enlarged turbinal that fills the space in the concave side of the deflection represents a compensatory hypertrophy. I am fully convinced that the enlarged and malformed turbinal, as herein described, instead of possessing any increased function is, in reality, deficient in every phase of function with which the normal structure is endowed.

One should bear in mind that the skeleton of the normal middle turbinal is not an independent osseous element like the lower turbinal, but an appendage of the lateral ethmoidal mass; that while its skeleton is covered with a dense mucosa, rich in venous networks that assume the character of erectile tissue, similar to that of the inferior turbinal, this is far less extensive. Furthermore, from its superior, attached border the middle turbinal occupies a dependent position, hanging freely between the wall of the nasal septum medially and that of the ethmoid body laterally, but not in contact with either wall except when in a markedly turgescent or inflamed state. The medial ethmoidal wall, covered or overhung by the middle turbinal, represents the most delicate and highly sensitized zone within the nasal channel; and upon the extreme sensitiveness of this area to mechanical pressure depends the primary and essential factor of the twofold pathologic influence. I believe, then, in the case of every unilateral, markedly hyperplastic middle turbinal, that the corresponding septal deviation is an adaptive measure of Nature to preserve patency of the air-passages, and is developmentally synchronous with the enlargement of the turbinal, to which it is genetically related, rather than a consequence of physical pressure exerted by that turbinal. That is, I believe that the pathologic potentiality in this complemental malformation, and malposition of different structures of the ethmoid unit, depends upon the degree of pressure of the hyperplastic turbinal against the medial surface of the ethmoid mass, and not upon its relation to the nasal septum.

In fact the surface of the turbinal is rarely in contact with the septal wall, and then only during periods of turgescence of the mucosa, which is not constant. It is therefore important to note certain characteristics of form which the hyperplastic turbinal commonly seems to assume. All middle turbinals of this class are enlarged in varying degree in their transverse diameter, appreciably more marked in the middle third and anterior end of the

posterior third, and are *rigidly impinged against the medial ethmoidal wall.*

The skeletal frame may be only slightly thickened but is usually distorted in shape, by angular deviation, or it may contain cells, such as have been variously termed cysts, or aberrant ethmoid cells. According to Schaeffer[5] these cells grow into the middle turbinal, the agger nasi, and the uncinate process, representing cells of both the anterior and posterior ethmoid group, and may be single or multiple. The osseous distortion of the turbinal, whether produced by cells, angular deviations, or curls, is covered by a mucosa that is irregularly modified and distributed, thinner over the medial surface but dense and even in thick longitudinal folds over other parts, especially along the lower border and the lateral surface. Such a turbinal, however much thickened in its body, rarely varies markedly from the normal in the comparatively thin osseous plate at the superior margin by which it is attached to, or rather is continuous with, the ethmoid mass. The one important difference, however, which characterizes the typical turbinal of noxious propensities is the rigidity with which it is held impinged against the medial ethmoidal wall. So marked is this rigidity that the turbinal will resist very strong pressure with a stiff probe before it can be forced from contact with the wall.

The contact of the two walls, turbinal and ethmoidal, is almost never plane, but irregular and undulating, their surfaces showing reciprocal elevations and depressions at points of seeming greatest constant pressure.

Obstruction to the infundibulum, interfering with ventilation of the sinuses, commonly attributed to thickening of the anterior end of the middle turbinal, is more often due to turgescence of thick folds of the mucosa on the lateral wall of the turbinal and is usually variable because highly sensitive to the influences of a focus of chronic infection, to external irritants, and especially to that mysterious agency, meteorology, resulting in divers complex phenomena. The syndrome by which the existence of a definite etiologic lesion may be suspected is not merely the result of this primary intranasal factor, but of the generally disordered functional balance which may develop from the coexistence of a focus of chronic infection. Thus, while the original force was acting it has more and more been acted upon till the two become complemental.

It seems to be a human characteristic to ascribe the manifestations of some functional disorder or disease to any influence or incident that has recently preceded it. Such instances are of frequent occurrence

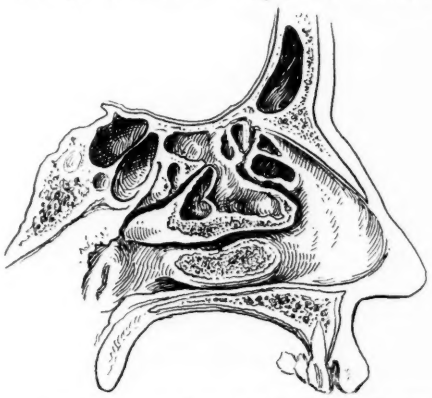

FIG. 1.—Sketch made from Schaeffer's "The Nose and Olfactory Organ," P. Blakiston's Son & Co., Philadelphia. This "lateral section of the nasal wall, with the paranasal sinuses exposed," is a very striking example of middle turbinal hyperplasia, with extensive cell formation, and from which medial view, even, can be seen the greatly increased lateral diameter, particularly in its middle third.

relative to the effects of a chronic low-grade infection. The error in deduction is, of course, the overlooking of the intermediate progressive steps and perhaps long period of time between the infected focus and the occurrence of the ultimate symptoms of which the patient complained, each step being an intricate process in itself, while the complexity grows with each new function disturbed or organ injured. It is from the standpoint of general disturbance in the harmony of functions that focal infection plays an important rôle in the effects of turbinal abnormality.

The maldevelopment in a large percentage of cases might never be sufficient to upset the general balance were the integrity of other organic functions preserved. There is no doubt in my mind but that the eradication of diseased tonsils in early childhood ofttimes saves the patient from complications of a far graver nature than the existing exigency for which the surgical treatment was applied.

While the congenital turbinal abnormality may not infrequently be recognized in early childhood, there is noticeably a more rapid hyperplastic development as puberty

Fig. 2.—Diagram intended to show the view of the middle turbinal usually obtained on examination of patient. Note that the line of vision strikes the inferior, marginal surface and not longitudinally from the anterior end. Also note corresponding deflection of the septum, and the under-developed size and position of the opposite middle turbinal. Dotted lines indicate frequent turgescent state of inferior turbinal, not, however, a result of nor dependent upon any abnormality of the middle turbinal.

approaches, at which age there is also greater toxic activity from existing foci of infection. At this stage, if the dual pathologic influences, represented by the turbinal malformation plus tonsillar sepsis, are allowed to persist, there is apt to occur rapid or even sudden aggravation of the symptomatic manifestations. Thenceforth, varying in type of symptom and in degree, according to the intensity of the etiologic lesions and the measure of inherent resistance, there may be observed in persons so affected a more or less constant state of lowered resistance, neurasthenia, nervous disorders, functional disturbances, endocrine imbalance, with more or less frequent periodic paroxysms, neuralgic in type and varying in form and degree from an ordinary headache to fulgurating migraine, in some cases terminating in a seemingly hysteric trance, and in others perhaps convulsions.

Among other diseases and disorders which have been found associated with this dual pathology with remarkable uniformity may be mentioned vertigo, asthenopia, eyestrain, cataract, hysteria, aphasia, amnesia, and (by virtue of marked analogy) epilepsy. If to the twofold factors, pressure plus focal infection, there be introduced the additional pathologic element of ethmoidal degenerative change, manifested by the existence of granulations, or polypoid tissue, then there may be added to the list asthma, hay-fever, and other types of hyperesthetic rhinitis. I believe that this class of disease, now regarded generally as an anaphylactic process, rarely exists in any degree without the pathologic ethmoidal state just referred to. A cursory glance at this list, no doubt, would give the impression of a heterogeneous mixture of disease entities and symptoms, including neuroses, pyschoses and reflex phenomena without regard to recognized classifications, which in a measure may be true.

When considered more carefully, however, from the standpoints of heredity, early manifestations, progressive character of development, climacteric exacerbations, etc., it is not difficult to see distinct and consistent analogous features. Most of the conditions enumerated in the first group could be classed under so-called "functional disorders of the nervous system without any known anatomical basis."

The symptomatology of all may vary in degree and duration, inasmuch as the twofold etiological factors may vary in intensity at different stages of their development or at certain periods in the life of the

patient. The one most commonly encountered symptom is headache of almost infinite variety; ofttimes, according to location, it may be termed neuralgia, but the most characteristic headache is the type of pain which begins about the eyes, or concentrated over the supraorbital notch, spreading over the frontal or temporal regions, at times severe just back of the mastoid process, and eventually becoming most intense in the suboccipital region and running down along the tendons of the neck, where it may last for hours or linger for days. The only difference between this type and the so-called sick-headache, or real migraine attack, is the gastric disturbance, and which is a common complication. It is not uncommon for the information to be volunteered that one or even both of the patient's parents, or, for generations, the family, had been subject to the same kind of "nervous headache."

I have seen in one instance four and many times three generations of a family in which both the characteristic intranasal lesions and a similar symptomatology were uniformly found.

The element of heredity in fact, in all of the diseases mentioned, is an important factor, as will be brought out later. Neurasthenia is perhaps the second most common symptom, and like headache will be found to exist in various forms and stages, and in all degrees of intensity.

That some of the maladies mentioned may at times exist where there is an absence of one or both of the dual elements, pressure plus focal infection, may be true; but in such case or cases it seems probable that there are or have been other similar influences to supply the two necessary factors—mechanical pressure or irritation to a delicately constructed and highly sensitized nerve zone, and a chronic toxic influence capable of producing general functional imbalance. The percentage of cases, however, in which the definite morbid anatomy is not demonstrable is small.

I wish to say that while I have personally had under my own observation some cases of each of the diseases and disorders enumerated, and many cases of some of them, there are a few, namely, cataract, amnesia, and epilepsy, with which my experience has been very limited. Reasoning by analogy, however, with reference to their hereditary characteristics, mode of development, and associated symptomatology, I feel justified in the inference of a common etiology.

Regarding cataract, I reported, last February,[4] three cases of senile cataract that were operated upon by the author for malformed middle turbinals and morbid tonsils, following which all progress of the cataract development ceased; five more cases have been examined since that time, all of which conformed to the same turbinal-tonsil pathologic condition (4 unilateral, 1 bilateral), four of which have been operated upon, by extirpation of the hyperplastic turbinals and enucleation of the faucial tonsils. Sufficient time, of course, has not elapsed to form any opinion as to the effect the operations will have upon the cases.

I wish also to say that up to the present time my only opportunity to see and to study cataracts has been upon such patients as have applied to me for treatment of some condition of their nose, throat, or ears; the ocular malady was elicited in the course of history taking. It is my expectation, however, to pursue a more thorough study of this class of cases in collaboration with those in charge of ophthalmological clinics. What is needed, of course, is the opportunity to eradicate the pathologic factors of supposed etiologic importance in the incipient or at least early stages of the cataracts, while there is yet chance for the preservation of practical vision; for, while there is no hope for the absorption or dissipation of an opacity once developed, it is probable that it may be checked in any stage at which the cause is detected and removed. Just as it has been demonstrated

that the cloudy degenerative changes in the membrana tympani resulting from long-continued toxic absorption from septic tonsils can be checked at any stage of its development by the enucleation of the tonsils, yet the cloudiness or opacity of any degree, once it has occurred, cannot in any measure be reduced or dispersed.

Regarding epilepsy, my opportunities for even the examination of such patients, thus far, has been limited to thirty advanced adult cases in a State institution for the feeble-minded, twenty-seven of which exhibited the typical diseased turbinal-tonsil combination as that observed in the various other maladies. I now have the opportunity, however, of taking up a systematic study of epilepsy in collaboration with the physicians in charge of an institution for epileptics, a report of which will be embodied in a separate contribution at a future date.

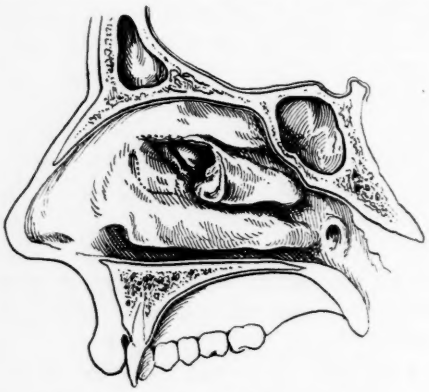

FIG. 3.—Drawing intended to show condition usually left where anterior part of the turbinal has been removed. It shows relations of retained portion of turbinal with reference to the uncinate, infundibulum and bulla when severed at about the middle line. Were only the anterior third removed, which seems usually to be the most common practice, there would be left even greater probability of pressure and obstruction from the retained portion. The anterior stumpy end of the part left also deflects the current of inspired air from its normal course, and provides a favorable surface for the accumulation of crusts.

Histories: I have selected from my record files five cases, each representative of a special class of disease manifestations of marked intensity, all but one possessing the characteristic lesions to which is ascribed the etiological responsibility, and each of which responded in a good measure to the applied surgical treatment.

Case 1.—M. Y., male. First examined in hospital August, 1921, at the age of twenty. Patient's mother stated that he was rather delicate from early childhood, with frequent digestive disturbances, and was always somewhat nervous, but did not suffer any particular discomfort till about fourteen years of age, when he began to have severe headaches, starting usually over the left eye, extending over the left temporal area, but eventually becoming most intense in the suboccipital region, and lasting a whole day or longer. These headaches continued to recur, with gradually increasing frequency and intensity, till he was about eighteen years old, when there developed a new phase to the attacks in the nature of a stuporous sleep which would come over him soon after the beginning of an attack of headache and would last sometimes from twenty-four to thirty-six hours. He would then awaken, relieved of the pain, but in a state of marked exhaustion. It was in one of these attacks that I first examined him; his left middle turbinal was very large, firm, and rigidly jammed against the lateral wall; his tonsils were distinctly septic. On the following day, under general anesthesia, the tonsils were removed and the left middle turbinal extirpated.

Result: Patient recovered from operation in normal time, and up to the present has had complete relief from the headaches and sleeping spells, but is still troubled with indigestion and is supposed to have gastroptosis. I have had two other patients who were very similarly affected, including the hypnotic trances, and who, likewise, were relieved by similar operations.

Case 2.—W. D., male, aged nineteen; senior college student. First examined, in hospital, January 16, 1922, after he had been suffering from an attack of amnesia for five days. He was in rather a highly nervous state, talkative but not irritable. From his parents it was learned that he had suffered

periodically since childhood from severe headaches, which had grown very much worse in the last year or two. It was known that he had had a violent headache on the morning of the day that he lost his memory.

In the middle of the afternoon he had wandered several miles out of the city to a small town and applied at a doctor's office for treatment of his headache, not knowing his own name nor where he had come from. The doctor succeeded in identifying him, and took him to a hospital, where he remained for three days under the care of the physician and a consulting neurologist. He was then brought to Philadelphia for consultation with Dr. H. A. Hare, and by whom I was asked to make an examination of the patient's nose and throat.

Examination revealed a high deflection of the septum to the left, with a large, firm, malshaped right middle turbinal, pressed rigidly against the lateral wall; faucial tonsils were of medium size, submerged, and by retraction of the pillars and exerting pressure a grayish liquid exudate was expressed from an orifice in the upper part of each tonsil, the lower surface being smooth and without cryptic openings. Turbinectomy and tonsillectomy were performed at two o'clock in the afternoon of the same day. At six o'clock the hospital interne telephoned me that the patient's memory had been regained on recovery from the anesthetic. There was no interruption in his convalescence, though he was kept in the hospital for ten days, where Dr. Hare maintained further watchful care on account of his state of rather marked physical exhaustion and nervousness. I have a recent report that this patient was relieved of his headaches, and has not experienced any further loss-of-memory attacks.

Case 3.—Mrs. K., female, aged forty. First seen November, 1917. She was subject to chronic headaches, hay-fever, asthma, and general neurasthenia, though her chief anxiety was centered upon a more or less constant vertigo which for several years had necessitated her sleeping on her back, since the slightest turn of her head to either side caused violent dizziness. She had been treated by specialists in several different cities, particularly for the vertigo. During the last two or three years marked cardiac arrhythmia had been an additional disturbing factor. She also had more or less persistent albuminuria, and it was to the cardiovascular and renal conditions that the vertigo had been generally attributed. Digestive disturbance was a more or less constant factor, and by rigid diet the severity of the symptoms could be somewhat ameliorated, but at no time entirely relieved.

Examination of her nose and throat revealed diseased tonsils and marked enlargement of both middle turbinals, the septum being fairly straight. (Bilateral middle turbinal hyperplasia of marked degree is extremely rare.) She had been warned on various occasions that she could not take an anesthetic. After careful examination, however, it was decided that at that time there were no contraindications to properly administered ether anesthesia, with gas-oxygen induction, so it was accordingly administered, and the tonsils and both middle turbinals were removed. To the lateral surface of the right turbinal and also to the ethmoidal wall there were attached accumulations of polypoid tissue which were entirely invisible before operation.

Result: Complete relief from the vertigo, headaches, hay-fever, and asthma; gradual convalescence from general neurasthenic symptoms, though the patient is still of a rather highly nervous temperament.

Case 4.—T. P., aged forty-five. First examined August, 1921. Came for opinion concerning tonsils because of rheumatic condition acquired a few months previously. He stated that he had been an invalid for practically seven years from kidney disease, irregular heart, and indigestion, for which he had been continuously under the care of physicians. His urine

showed an extremely heavy cloud of albumin with granular and hyaline casts; no organic lesion of the heart was detected, though the arrhythmia was marked; his nasal membrane was turgescent, but on shrinkage there did not appear to be more than slight hyperplasia of either middle turbinal, nor did they seem to be causing any pressure against the lateral walls. He was rarely troubled with headache, and

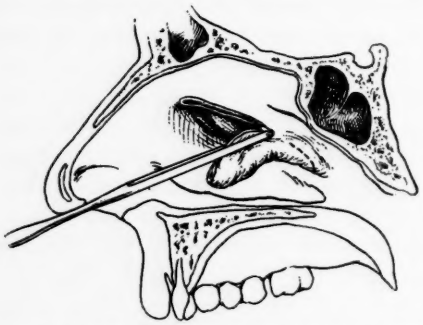

FIG. 4.—Author's method of extirpating the middle turbinal. Starting anteriorly, and hugging closely to the ethmoidal wall, the thin marginal attachment is cut with swivel knife about three-fourths of the distance, and the remaining part is severed with a wire snare.

then not of marked intensity. Tonsillectomy was performed under nitrous-oxide-ether anesthesia the following day; he was kept in bed for one week, and then allowed to return to his home in the western part of Pennsylvania, feeling perceptibly better than before operation, even at that early stage. I saw him two weeks later, and found him free from rheumatic pains and his digestion was much improved. I next met him, six months later, on the street, when he stated that he had for some time seemed perfectly relieved of all heart and kidney symptoms. This man, though suffering from marked chronic cardiorenal disease and indigestion, the result of chronic septic tonsils, without turbinal abnormality, had not suffered from headache, nausea, nor vertigo.

Case 5.—D. P., female, aged seven, on examination in 1914. It was observed before she was three months old that she suffered a peculiar difficulty in breathing, which, by the time she was around three years of age, had assumed the characteristic symptomatology of bronchial asthma. The attacks responded but slightly to any form of medication. When five years old the removal of her tonsils gave partial relief, but within a year's time she was almost as badly affected as before.

When I first saw her at the age of seven the asthmatic paroxysms had been of almost daily or nightly occurrence, and her father was in somewhat of a panicky frame of mind, having been advised by his physician that the only hope for the child would be in another climate, and he was not financially able to sacrifice his business position and begin anew in another locality.

Examination of the child showed a clean throat, but the right naris was almost completely obstructed by the middle turbinal, which, besides being distinctly hyperplastic, showed areas of polypoid degeneration, and was firmly fixed against the lateral wall. The turbinal was extirpated, under general anesthesia, followed by prompt and complete relief from the asthma, which up till two years ago, when I had my last report from her, had never recurred.

Between the turbinal and ethmoidal wall in this case, as in Case 3, there were accumulations of polypoid tissue.

I shall not prolong the citation of individual reports, though my records include other similar cases and many of migraine, neuritis, neurasthenia, asthma, hay-fever and general neurotic disturbances that have in a large measure responded favorably to the removal of diseased tonsils and malformed middle turbinals.

Diagnosis.—In an effort to determine the degree of responsibility that may be attributed to the pathogenicity of the twofold turbinal-tonsil agency the problem must be considered from a number of angles. From the standpoint of the ascribed primary factor it must be remembered that even normal middle turbinals vary in size and conformation, so much so that it is not always easily determined just where normality ends and anomaly begins. Thus it may be a matter of fine distinction at times, where symptoms

are not pronounced, to decide whether a seemingly well-defined malformation is pathologic or innocent, in which case a conclusion can be reached only by process of exclusion of other possible influences. But in the majority of cases there are definite, distinguishing features by which the type of morbid turbinal with which the hypothesis herein proposed is concerned can be identified.

To that end the following points should be observed:

The middle turbinal, normal or diseased, is not capable of as marked vasomotor dilatation and contraction as is the inferior turbinal.

The tranverse diameter of the pathologic turbinal is increased, particularly in its middle third and anterior portion of the posterior third; its position is always rigidly fixed in contact with but not adherent to the ethmoidal wall; its consistency is firm, particularly over its medial wall and the greatly widened inferior margin; its pressure against the ethmoid body is usually most intense along the lower lateral thickened border of the turbinal; this may be so markedly evident that, while a probe may readily be passed between the superior marginal attachment of the turbinal and the ethmoidal wall, yet an attempt to sweep it downward is met by impassable obstruction from the rigid pressure of the lower margin. If sufficient pressure be exerted to separate the turbinal from its rigid ethmoid contact by pressing it toward the septum, a distinct cracking sound, from fracturing of the superior marginal osseous attachment, can be heard.

The zonal limits or boundaries of the pressure area upon the ethmoid wall must of necessity be variable owing to the variations in the turbinal malformation. This variability of location and extent, as well as in intensity, furnishes the basis for the great variety manifested in the symptom-complex. Henry Christian aptly says: "Diagnosis in the final analysis depends on proper evaluation of symptoms and signs, recorded by an available means and interpreted with the critical judgment of a large common sense." That is particularly true with reference to the syndrome of the conditions with which we are dealing. There is no pain at the site of the turbinal lesion, nor are there any localized throat symptoms to suggest tonsillar disease. The patient, consequently, is not aware of intranasal pressure, nor even of obstruction, except that produced by the associated turgescence of the inferior turbinal, or low septal deflection, ridges, spurs, etc., which hamper respiration, but are not directly concerned in the proposition herein presented. Every diagnosis, then, must be reached through careful consideration of the symptomatology in conjunction with a definitely demonstrable hyperplasia of the middle turbinal, showing certain characteristics of type and position, together with an associated active or previously existing focus of chronic infection.

Hereditary Phase.—Supposing that the occurrence of a certain group of maladies, usually classed as cryptogenic, can be accounted for on the basis of the definite anatomic alterations represented in the type of middle turbinal herein described, then, etiologically, how are those anatomic alterations to be explained?

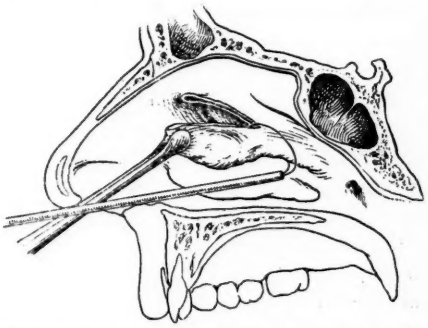

FIG. 5.—Second step of extirpation by the swivel knife and snare method. The snare prevents the stripping of a ribbon of mucosa over the Eustachian orifice and a consequent atresia which might be possible were the removal attempted by means of the swivel knife alone.

Since they can be attributed neither to chance nor to traumatic injury, the only logical conclusion is that they represent a congenital maldevelopment, fixed by heredity and thenceforth to represent a potential pathologic force, depending upon the inci-

dence of other possible associated influences in their future development, particularly the incidence of focal infection, with the consequent train of disordered functions and disturbed reflexes which work toward a general reduction of resistance.

It will be observed that practically all of the diseases and disturbances with which this morbid anatomy is found associated comprise a group in which is commonly recognized a more or less distinct tendency toward hereditary influence. The occasion will not permit of an extensive consideration of this phase of the subject, but I wish to commend the very illuminating and elaborate contribution of Dr. J. Arthur Buchanan: "A Consideration of the Various Laws of Heredity and Their Application to Conditions in Man."[1] Inasmuch as a specific example cited in his thesis bears directly upon the conditions under discussion, I wish to quote from several paragraphs, as follows, under the subhead "The Distribution of Migraine in Families:" "A study was made of 127 families, one or more representatives of which were examined in the Mayo Clinic in 1919. Migraine followed the two laws of Mendel (as illustrated by figures). Of the total number of children in 127 families, 198 had migraine and 610 had the character without migraine. At the time the study was reported a combined Mendelian ratio was calculated for all the families studied. This ratio was incorrect, as amalgamation of the crosses was contrary to the scheme of Mendel. The ratios were correct for the individaul groups. Like all hereditary characters migraine exists in either the homozygous or the heterozygous state. The heterozygous state has led many writers to say that migraine is hereditary in 90 per cent of instances and in various other percentages, because it occurs in a number of families in which it is not demonstrable in the parents. During the last two years many cases in the Mayo Clinic have been observed in which migraine was not present in the parents, but present in the brothers or sisters, if the family was sufficiently large, or present in one or the other of the grandparents. It is to be remembered that by means of the heterozygous status of certain persons a character may be transmitted through many generations of small families without any sign of its presence. The character may appear in the first large family. The homozygous state of migraine has been studied in three families in which both parents had migraine. If migraine exists in a homozygous state, all children resulting from such unions should have migraine. This occurred in the three families studied." Under "Comment" he further states: "Migraine is the expression of a hereditary character, but the physiological processes which occur at the time of the manifestation of its phenomena are unknown." Then arguing on the basis of transmission by the "blood group" theory, he proceeds as follows: "It is not possible to change the blood group by either surgery or drugs, so it does not seem reasonable to expect that migraine which is a similarly derived character could be influenced by any of the procedures recommended. Patients with migraine who have been examined in the Mayo Clinic demonstrate the futility of all sorts of treatment." In this respect my own cases, of which I have had many, have responded favorably in a high degree of uniformity.

It was owing to certain analogies in the symptomatology and hereditary tendencies of migraine and essential epilepsy that I became interested in the investigation of a possible etiologic relationship between the turbinal-plus-focal-infection hypothesis and epilepsy.

Thus the following quotation from Buchanan's article is of interest: "Hippocrates believed that essential epilepsy began *in utero*, and as a consequence of this belief and the absence of a pathological basis, many diseases, such as neurasthenia, hysteria, insanity, and the undefined group of diseases known as nervous disorders or neuropathies, have been incriminated as causal agents. St. Hildegard seems to have been one of the earliest writers to suspect that migraine and essential epilepsy were expressive of the same entity. . . . In

order to obtain data on the relation of the various neuropathic influences to essential epilepsy, two series of cases observed in the Mayo Clinic were analyzed. . . . In the first series of 128 cases, migraine occurred in the ancestral or personal history or in that of the brothers and sisters in 53.9 per cent of the cases. The 128 cases comprising the second series had been carefully studied in the Section of Neurology, and of these cases 66.4 per cent gave a history of migraine in ancestors, brothers or sisters or in the personal history. In the former series migraine was present before the onset of essential epilepsy and alternated with or continued with epilepsy in 14 per cent of the cases studied. In the latter series this occurred in 10.5 per cent of the cases. The genetic relationship of migraine to essential epilepsy seemed to be quite striking. . . . Essential epilepsy and migraine are transmitted from generation to generation as the expression of the same underlying factor in the germ plasm. The mechanism for the production of the seizures is unknown."

In a study of essential asthma, reported in the same article, Buchanan further observes: "In essential asthma, as in all conditions in man, the etiology of which is obscure, the mechanism of heredity has been believed to play an etiological rôle. Geddings reviewed the statistics of the earlier writers, and came to the conclusion that the tendency to essential asthma is hereditary. All of the earlier writers, with the exception of Drinkwater, reported a percentage of inheritance of essential asthma varying from 10 to 50 per cent. Drinkwater reported his families as expressive of the segregative power of the germ plasm. The more recent literature has been reviewed by Adkinson, who at the same time presented data obtained from a large number of cases. She found a family history of essential asthma in 48 per cent of the 400 cases studied, and came to the conclusion that asthma is hereditary in a varying percentage of cases."

The hereditary phase of the three entities, migraine, essential epilepsy, and essential asthma, as presented by Buchanan, is significantly interesting when compared with my own clinical data regarding the uniform existence of the middle-turbinal-tonsil pathologic unit in association with the same three maladies.

In this connection I wish also to quote from Henry Kirkpatrick[2] on the subject of cataract and heredity: "Hereditary predisposition to the formation of cataract is fairly generally admitted, and numerous observers have recorded instances in which successive generations have been affected by the disease. Anticipation, or the appearance of the disease at an earlier age in succeeding generations, has occurred in

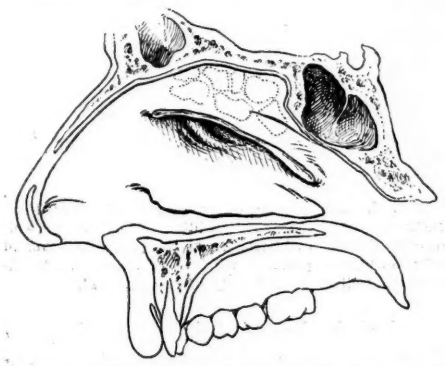

FIG. 6.—Not infrequently the entire line of the marginal attachment may be thin and free from evidence of obstruction, in the uncomplicated type of hyperplasia, even though the body of the turbinal be markedly thickened.

some cases, and the writer recollects one such in which a Hindu woman, aged twenty, whose mother had been operated upon for senile cataract a few years previously, developed a presenile cataract in each eye and brought with her to the hospital her three children, the eldest being six years old, all of whom were affected by double cataract."

On the same subject de Schweinitz[3] states: "Remarkable examples of the influence of heredity in the formation of cataract have been published. It has been noted that the tendency is more marked in the child-bearing period, and that the transmission is through the female line; transmission through the male line only, however, has been recorded. All phases of this subject have been elaborately studied by

Nettleship. In both groups of acquired cataract, that is, senile and presenile or juvenile cataract, the transmission is almost always direct. Occasionally a generation is skipped. Referring to the frequency of *inherited cataract*, he found that women are somewhat more liable to familial acquired cataract than men."

Schaeffer states: "It is reasonably certain that defects in the sense of smell are

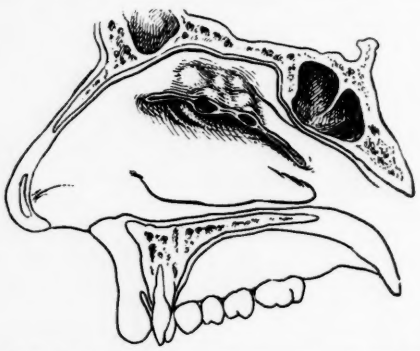

FIG. 7.—Appearance of an occasional severed attachment of a malformed middle turbinal, where well developed cells, extending from the posterior ethmoid cells, occupy a position within the marginal attachment as well as in the body of the turbinal.

inherited in human beings, especially so since the function of olfaction is degenerate and vestigial as compared with other forms."

Periods of anosmia not uncommonly occur in those possessing the ethmoidal malformations incident to and synchronous with middle turbinal hyperplasia, during which periods there is apt to be a more or less continuous state of marked turgescence of the mucosa of the middle turbinal structure.

Treatment.—Inasmuch as the ascribed etiology of a certain group of varied manifestations of disease is believed to be twofold, comprising a definite anatomic lesion as the primary factor and a focus of chronic infection as the intermediary or complementary force, and since the anatomic lesion is a developmental abnormality, determined by heredity, potentially pathologic at any age, but showing a propensity to exacerbations at certain climacteric periods, and recessions at others, particularly late in life, and at all times materially supplemented by the coincidence of focal infection, the treatment must of necessity be considered and applied in accordance with the length of existence of the disorder, the intensity of its symptomatology, and the character of associated disturbances which may exist.

That the eradication of any chronic focus of infection, at any age of the patient, or stage of development of the disease, will in some measure mollify the intensity of the manifestations, at least for a time, is practically always true. Particularly in the case of children, then, the logical procedure of choice is to eliminate all detectable foci of infection, and, in a large percentage of cases, the more violently disturbing features that would commonly develop later, in keeping with the usual progressive tendencies of such maladies, may be obviated.

That the principal incubation and sheltering site of the most complex and vicious hordes of bacterial organisms is situated within the faucial tonsils, there remains but little doubt; that nearly all other chronic sites of infected foci are either secondary to or, when present, are aggravated by the continued existence of the primary focus, is almost as free from dispute; and there is likewise a comparable unanimity of opinion concerning the most practical procedure, according to the light of our present knowledge, for its eradication. But in order that the highest possible degree of integrity of all bodily functions be maintained, the measure of effectiveness attending the interception of bacterial transmission from this primary focus naturally must depend upon the eradication of the tonsils at a period prior to any irreparable damage to functions and organs. It seems probable that all adult tonsils that give evidence of being containers of infected foci have been chronically so, with periods of recession and exacerbation, since childhood, the variableness in their effect on different individuals depending upon the incidence of exposure, immunity, and all influences of resistance and repair.

In the matter of the nasal factor, the

avoidance of specific irritants, and immunization against them, is always timely and proper, but rational treatment should also aim toward permanently fortifying the body against its susceptibility to those irritants. To that end I feel justified in commending the removal of the nasal factors, herein described, as the most effective measure to which we may have recourse.

I am not unmindful of the fact that malformed middle turbinals have long been recognized, widely discussed and variously treated and mistreated, but I am persuaded, through many years of clinical observation, that there are certain phases connected with their significance that are commonly not appreciated. There seems to have been a period about two or three decades ago, or earlier, when the turbinals attracted a great deal of attention, with the result, as frequently happens in such cases, that the promiscuous removal of turbinals became a more or less popular procedure. The object in the mind of many seemingly was a matter of establishing freer nasal respiratory space in those cases of intumescence and hypertrophy, often merely vasomotor disturbances, and due largely to the influence of focal infections; hence the lower turbinals suffered the abuse scarcely less frequently than the middle. Naturally, it did not take long for the harmful results of such promiscuous radicalism to become evident, so there was instituted by those of saner judgment a campaign of condemnation against the practice of "wholesale turbinectomy," with the result that operations on turbinals of any type or description was practically abandoned. Then followed the cauterizing period, which followed a similar course. It was at that period, twenty years ago, that I began the practice of rhinolaryngology, and there was no admonition that I heard more frequently nor observed more strictly for some years than "spare the turbinates."

With the later development of the principle of focal infection, however, which supplied a rational explanation for the various chronic states of turbinal intumescence or turgescence, it became easier to detect the actually malformed, malplaced, or otherwise pathogenic middle turbinal, and for the treatment of which there are practical measures of sane and effective surgery. It must not be overlooked, however, that the inferior turbinal is never concerned as an etiological factor in the conditions herein under discussion; in fact, indication for the resection of any part of an inferior turbinal for any purpose whatsoever is exceedingly rare.

The common practice of resecting only a part, usually the anterior third, of the middle turbinal in an attempt to relieve such obstructions indicates a mistaken impression regarding the most culpable part of the structure or the character of its offense. Out of several hundred middle turbinals which I have extirpated during the past sixteen years, I have not seen a single instance where the middle third or the anterior part of the posterior third did not prove to be the most damaging, because of its being the most thickened portion from malformation and hyperplasia, whether the

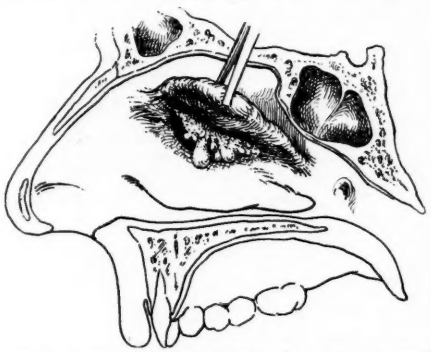

FIG. 8.—Drawing intended to show a polypoid degenerative condition (were it possible for the turbinal to be raised in this manner) indicating chronic infection of the ethmoid cells, and frequently found in asthmatic and hay-fever patients.

case be one of pressure alone, or complicated by degenerative changes from chronic sepsis in the ethmoid cells.

The following abstract from the THERAPEUTIC GAZETTE is illustrative of the point cited:

"In the *Lancet* of February 18, 1922, Williams states that the simplest cases of peripheral nasal headaches are those due to pressure of the middle turbinal body on

the septum nasi. Usually there is a deflected septum, and then the middle turbinal body, when turgid or congested, becomes crowded against the corresponding part of the septum, causing a feeling of tightness in the nose, and headache, usually supraorbital, . . . and may be cured by removal of the anterior third of the offending turbinate."

In contrast to this, my own procedure has been, *without exception,* where *any part* of the middle turbinal was deemed in need of removal, to perform *complete and clean extirpation,* and following which I have never seen the slightest degree of atrophy of any intranasal membrane, nor have I seen any patient become more susceptible to sinus infection. In fact quite the reverse has been true.

Anticipating the criticism that the complete removal of the middle turbinal exposes the ethmoid labyrinth to increased liability to infection, I wish to say that there could be no greater error in judgment. In the first place, the incidence of infection even in the normal sinuses depends not so much upon the exclusion of supposed foreign bacteria as upon the integrity of inherent agencies of resistance. One might as well argue that the occlusion of a nasal passage would protect its lining mucosa from infection, for the normal middle turbinal, by its conformation and position, favors rather than obstructs sinus ventilation.

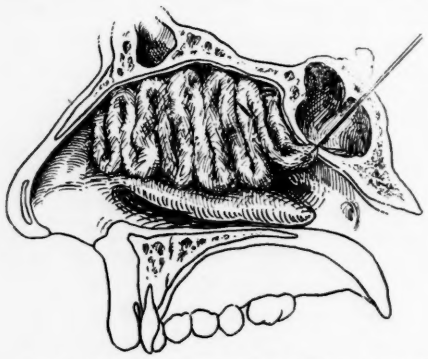

FIG. 9.—Method of postoperative packing with iodoform gauze. The loop of gauze is raised with hook to show position of the first fold of gauze with reference to the posterior end of the severed turbinal. It is important that the gauze never be allowed to extend posteriorly so far as to lie in contact with the Eustachian orifice.

If, in the second place, that premise be true, then the abnormal turbinal facilitates sinus infection in proportion to the degree to which its hyperplasia and malformation restrict normal ventilation. Furthermore, since it can be shown that the noxious influence of the type of turbinal malformation, herein described, is conducive to disease as much, if not more, through its additional propensity toward irritation by pressure, its conviction seems doubly justified.

The correctness of these statements has been substantiated by clinical results.

I wish also to add that I not only favor the ablation of the middle turbinal, where any surgical interference is justified, but that the resection of any part is more productive of harm than if the diseased structure be left unmolested, and is comparable to the inefficiency of incomplete removal of the faucial tonsils. This position I maintain not only because of the fact that the element of pressure, which is always posterior to the portion which is commonly removed by resection, is a more potent pathogenic factor than obstruction, which I grant may result from sufficient hyperplasia of the anterior third, but for the reason that the abrupt cut surface of the retained portion of the structure interjects two additional noxious influences: (1) The greater deflection of the inspired current of air; (2) the accumulation of crusts, or inspissated exudate in event of a chronic sinus infection, ozena, etc. (Compare Fig. 3 with Fig. 6.)

The technique which I have always employed in the extirpation of the middle turbinals is illustrated by Figs. 4, 5, and 9, and needs no further description other than to say that when the tonsils are to be removed, both operations are done at the same time under general anesthesia. If the nasal septum is markedly deflected, it is also straightened at the same time by submucous resection.

Prognosis.—It must not be inferred that

I am going to claim that constant and unfailing cure of all the diseases or disorders mentioned can be expected from the elimination of the two specified complementary pathologic units, for such is far from my intention or belief. That there will always be variableness in the intensity of the symptomatology in different cases is necessarily true and depends not only upon the degree of abnormality developed in the primary factor, but also, and very largely, upon the incidence of the intermediate or complementary factor, a focus of chronic infection, and the resulting measure of disordered functions or general constitutional derangement.

The same consideration must as well, then, be taken into account in the estimate placed upon the evidence of relief obtained by any treatment instituted. Astonishing as may be the capacity for revival, repair or even regeneration of certain structures or organs and their functional activities, when some chronic interference is removed, it is only reasonable in the average course of events, even when the original cause is effectively eliminated, that the prognosis must depend upon the degree of permanency to which the general functional balance has suffered interruption as a result of the previously existing lesion and the accessory pathologic influences. I believe it can be fairly stated, however, that practically all cases in which the specified dual pathology can be demonstrated, regardless of the particular syndrome manifested, will show perceptible benefit from the removal of those pathologic factors, and many of them, even of long duration, be practically cured.

CONCLUSIONS.

Billings, in making a statistical report of chronic infectious arthritis, wrote: "It is generally recognized that the end-results of treatment of patients who suffer from a recognized disease entity are a fair measurement of the success of the management and treatment and also of the correctness of the ascribed cause and of the character of the morbid process." I have ventured to draw certain deductions from a similar standpoint, with this difference, that a number of maladies, bearing certain analogous points in their mode of development and in symptomatology, have been considered instead of a single entity.

I have attempted, in so far as the allotted time would permit, to give evidences upon which I have based my faith in the hypothesis set forth in the opening paragraph of my contribution. It is a problem of many angles, each of a dozen phases being sufficient for an extensive paper, if carried to its logical end.

We can only infer what is probable, but in a chain of reasoning, rational and logical inferences must lead to an ultimate conclusion.

I believe that when we more fully appreciate the significance in the not infrequent existence of these peculiar, congenital malformations of the intranasal anatomy, and their later noxious influence in combination with subsequently developed foci of infection, primarily and principally in the faucial tonsils, we shall be in position to apply a more potent measure toward the prevention of many common ills than has yet been utilized.

Upon that principle I believe the rhinologist of to-day may hold a position of rare advantage for the early detection of potential factors in the etiology of many common diseases, which, so long as their origin remained unknown, were naturally unamenable to cure.

I believe that the hypothesis is sound, and that its application is practical, but, in advising what will be termed radical surgery, I am well aware of the peril of its abuse, both in the matter of its promiscuous choice and in that chief of abuses, incompetency in its application. In other words, the strength or weakness in either of my premises or arguments is not to be judged by any indiscriminate attack upon turbinals. The cases needing such treatment as herein advised must be selected by

qualified judgment after careful observation, and when a guilty structure be justly convicted there must also be employed the highest accuracy and skill in its execution.

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Blood Transfusion as a Therapeutic Measure[1]

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Three names stand out preëminently in the modern development of blood transfusion—Crile, Lindeman, and Lewisohn.

Crile was instrumental in reëstablishing blood transfusion, but because of the great surgical skill required his method was not generally accepted, and until Lindeman devised the syringe and needle method transfusion was little used. This had the advantage of accurately measuring the quantity available for general use, but as the blood so frequently coagulated in the instrument it soon met with disfavor. Lewisohn instituted the citrate method, thereby overcoming this one objectionable feature. In 1915 Unger developed a method by which whole undiluted blood could be transferred, without coagulation and without the injection of air.

There are two factors which are chiefly responsible for the success of blood transfusion as a therapeutic measure: (1) Improved and simplified technique. (2) The institution of blood typing by Shattuck in 1899 and Landsteiner in 1900.

METHODS OF TRANSFUSION.

Citrate or Modified Blood Method.—This method was instituted, as stated previously, in order to prevent coagulation, the objectionable feature of the old whole-blood method. Its disadvantages are:

1. It does not always prevent coagulation, and the entire amount of blood may be lost.

2. A foreign body is being introduced, and there are recorded cases of reactions, resulting in death from the injection of 50 cc of a 2-per-cent sodium citrate solution.

3. Citrate solutions have a high Ph value, and it may be that the rapid neutralization in the body disturbs the colloidal equilibrium of the body cells, thereby producing a reaction.

4. Because the blood is subjected to much stirring, because it is strained through gauze, and then passed through long rubber tubing, the chance for the development of certain degrees of coagulation is great.

5. Contamination is very possible because of the exposure to air, and the repeated handling.

6. Most writers agree that reactions are more frequent than with the whole-blood method.

7. A thrombopemia is produced by the addition of citrate by the stirring and by the exposure to air.

The advantages of this method are:

1. It avoids the necessity of having the patient and donor in the same room.

2. In cases of septicemia or lues, it avoids the possibility of infecting the donor.

Unger Whole-blood Method.—As stated before, the reason for the addition of citrate was to prevent coagulation.

If a method is devised that assures the

[1]Read before the Mahoning County Medical Society, Youngstown, Ohio.

transfer of blood without coagulation, what reason can there be for the addition of an anticoagulant?

Advantages:

1. Whole undiluted blood is used.
2. A foreign body is not injected.
3. It is quickly and easily performed.
4. There is less chance for contamination.
5. There are fewer reactions.
6. The thrombocytes are not disturbed as the blood does not come in contact with the air, and it meets with a minimum of resistance in the operation.

Its only disadvantage is that it requires a special apparatus.

Reactions.—There are six types of reactions that may occur following transfusion:

1. Fever.
2. Chill or chilly sensation.
3. Fever plus chill.
4. Slight hemolysis (petechiæ).
5. Severe hemolytic reaction.
6. Allergic (nausea, vomiting, urticaria, pruritus).

The most common reaction is the simple rise in temperature with or without chill. The rise may be only a degree, or the chill expressed by the patient as a chilly sensation. Various reports have placed these reactions as occurring in from 20 to 60 per cent of cases in which citrate solutions were used.

Unger reported a series with 10-per-cent reactions using whole blood.

In 100 transfusions by the Unger method we have found a rise in temperature of more than a degree in 19 per cent and a chill of varying severity in 9 per cent.

Causes of Reaction.—Just as there are several types of reactions, so are there a variety of causes for them. The simple rise in temperature and slight chill are not of any great moment, nor do they seem to harm the patient. It is the hemolytic reaction that causes extreme anxiety for those who perform many transfusions. Every precaution may have been taken, the transfusion perfectly carried out, and yet hemolysis occur, often resulting in death. The causes for reaction are as follows:

1. Improper typing.

2. Failure to cross-agglutinate—that is, to match the patient's serum against the donor's cells, and the donor's serum against the patient's cells.

The terms "universal donor" and "universal recipient" should be discarded.

3. Change of type. Cases have been reported in which the type of the patient has changed following a transfusion.

4. The products of early coagulation play a prominent part in the causation of minor reactions. The greater the resistance with which the blood meets, the longer the exposure to air, the more chance there is for the early products of coagulation to form; and these products are toxic. Lewisohn believes that the personal element enters into transfusion reactions—that is, the more experienced the operator the smoother the technique, the fewer the reactions. This means that if a transfusion is slowed through poor technique, the chance for slight coagulation of blood is greater. In citrate transfusions, the products of early coagulation are very likely to form. The blood is stirred while being drawn, is exposed to air for a period, and finally injected through a long rubber tube. In some instances the entire amount of blood clots before it can be used.

5. Type of disease. Serious reactions are more common in three types of disease—leukemia, pernicious anemia, and septicemia. In acute hemorrhage and in moderate secondary anemia, serious reactions are uncommon.

6. The injection of sodium citrate solution in itself often results in a reaction, and I personally know of one instance of death following the injection of 150 cc of 2-per-cent sodium citrate.

7. The injection of too large amount of blood or too rapid injection may produce cardiac dilatation, which should be classed as a reaction.

8. It has been my observation that if

more than a week elapses between transfusions, reactions are more frequent and more severe. This has been so noticeable that in transfusing after the seven-day period I use a small amount and inject very slowly. A few patients have developed nausea, vomiting, urticaria, pruritus, dyspnea, and slight pulmonary edema. These symptoms, considered with the fact that reactions seem to be more frequent after the seven-day period, bring up the question of foreign protein and hypersensitiveness as causes for certain reactions.

HOW REACTIONS MAY BE PREVENTED.

1. Cross-agglutinate every patient.
2. Cross-agglutinate before each transfusion even though the same donor is used.
3. Use whole blood rather than citrated blood.
4. Carry on the transfusion with the greatest despatch in order to prevent the formation of the early products of coagulation.
5. Inject a moderate amount, from 250 to 350 cc, at the first transfusion.
6. If possible give transfusions at intervals of less than seven days.

When the possibility of a hemolytic reaction is suspected inject 20 to 40 cc of blood and see if a reaction occurs before giving more.

DANGER SIGNS, OR WHEN TO DISCONTINUE THE TRANSFUSION.

1. When the patient complains of fulness in the chest or difficulty in breathing, it may mean too much blood, too rapid injection, or impending hemolysis.
2. Precordial or substernal pain usually indicates cardiac dilatation.
3. A short, repeated dry cough is a sign of cardiac dilatation.
4. Nausea or vomiting.
5. Pain in the epigastrium or splenic region often indicates an impending hemolytic reaction.
6. Marked facial erythema may indicate impending hemolysis.
7. Urticaria or pulmonary edema.
8. When the tourniquet is applied to the arm preparatory to the insertion of the needle, and it is noticed that petechiæ form above and below the tourniquet, one should proceed with the greatest caution, or better discontinue the transfusion. This sign indicates impending hemolysis, and a fatal reaction may occur. In purpura hemorrhagica this rule does not apply as it is a common phenomenon of this condition.

Unfortunately, even though all precautions are taken severe hemolytic reactions occur, sometimes resulting in death. This accident has occurred only in our patients with primary anemia.

TRASFUSION IN CHILDREN.

Just as a severe anemia develops quickly in a child, so are the results from transfusion quick in formation. However, the art of transfusion in children is almost distinct from that in the adult. Whole blood is preferable. The blood may be injected in the arm, in the fontanelle, in the jugular vein, or by transperitoneal route. Probably the method of choice is that of the median basilic vein. It is almost always necessary to cut down on the vein, which offers the only disadvantage. The fontanelle route is dangerous and is useful only in the very young; it requires great skill, and there is always danger of clot formation in the sinus. The jugular vein route is a difficult one because the vein is very movable, the angle of approach is sharp, and a wriggling, twisting child adds much to the difficulty. Dr. Falls has devised a table to hold the child still and the head in such a position as to give the best exposure of the vein. With this method the jugular vein may be used with some hope of success. Sipperstein has suggested the transperitoneal route and has shown that the injection of blood into the peritoneal cavity stimulates the formation of new blood elements, and that the red blood cells injected are absorbed from the peritoneum into the blood stream. He suggests the use

of citrated blood, which is definitely contraindicated in conditions with a lengthened coagulation or bleeding time. Furthermore the operation is not without danger as abdominal distention is frequently met with, and the possibility of getting into or going through a loop of gut is very great. Another point to consider is the fact that there is an increase in red blood cells and hemoglobin after the injection of oxygen into the peritoneal cavity for diagnostic *x*-ray.

INDICATIONS FOR TRANSFUSION.

In considering the indication for transfusion the acute hemorrhages deserve first place. Little need be said concerning the value in this type of case. It is almost never too late, and even in most hopeless cases remarkable results may be achieved.

In the group of patients that are debilitated and at a standstill medically or surgically, too little attention is paid to the secondary anemia that is present.

As a group, patients with secondary anemia offer the best chance for success with this form of treatment; yet because the effect of a secondary anemia is overlooked, because the interest is centered on the primary condition, or because a transfusion is considered somewhat of a troublesome risk, it is not tried. These patients seldom suffer severe reactions, and the use of this measure is therefore attended not only with the most agreeable results but with the greatest safety. This group includes patients with pelvic suppuration, chronic suppurative slow healing wounds, arthritis, nephritis, gastric ulcer, and certain of the acute infections. It is also useful in shortening convalescent periods, in making a poor surgical risk a safe one, and in patients with jaundice. Unfortunately transfusion has not been attended with much success in the leukemias.

Septicemia.—Much has been written condemning the use of transfusion in septicemia because it is often attended with severe reaction and because it has no direct effect on the infection. There is, however, a very definite indication for transfusion in these patients. It should be given not with the hope that the infection will be removed or even directly diluted, but with the thought of treating the secondary anemia. In the fulminating infections that carry the patient to a critical state in a few days or a week, there is little that can be accomplished with transfusion. But when the infection drags on and a secondary anemia develops, much good is accomplished by the addition of whole blood. In three patients, one suffering with a staphylococcus albus and two with streptococcus viridans infection, transfusions were given when hope of recovery was lessening, and in each instance not only did the blood elements increase but the general condition of the patients was greatly bettered. They were discharged well.

Frequency of Administration.—Blood counts were made the day before, one three, five and seven days after transfusion. In the patients with secondary anemia it was found that there was an initial rise in red blood cells and hemoglobin, followed by a slight drop from the high point, in about three days; then in five to seven days there would be a slight drop, or possibly an increase, and in many patients the increase would be steady from this point.

In pernicious anemia and purpura hemorrhagica, particularly pernicious anemia, it was found that after the initial rise the blood elements dropped steadily, so that in five, seven or ten days the count was often lower than before transfusion. It seemed only reasonable therefore to give the transfusions, in these cases, before the drop occurred. It is our plan to administer blood at the peak of the rise, that is every four days, in moderate amounts of 350 to 450 cc.

Purpura Hemorrhagica.—Blood transfusion is practically a specific in the treatment of purpura hemorrhagica. A transfusion should be given every four to five

days in amounts of about 500 cc. If the patient is in a critical condition when first seen it may be necessary to give as much as a liter in order to place him within the margin of safety.

Citrate transfusions are contraindicated in this disease because the bleeding time is greatly lengthened and the blood platelets reduced well below one hundred thousand.

One transfusion is often enough to stop the bleeding from mucous surfaces, and frequently the patient is brought from a comatose state to one in which he is in possession of all his faculties. The indication of improvement is not only the well-being of the patient and increase in hemoglobin and red blood cells, but also an increase in blood platelets. This often does not occur at once, and in many patients the platelet count does not reach normal until long after the red blood cells and hemoglobin are within normal limits.

It is important to make weekly red-cell, hemoglobin and blood-platelet counts after the patient has reached a fairly high level. If the red cells drop below 3,500,000 and the hemoglobin below 70 per cent, another transfusion should be given. The patient should be under continual observation.

Pernicious Anemia.—Blood transfusion in this disease is productive of more good results, of more permanent value, and in a shorter time than any other form of treatment. Yet there are many who hesitate to use it, and some even go so far as to say that it shortens the life of the patient. That may have been their experience, but the results were due to the improper use of their transfusions and not to the method itself.

In the first place citrate transfusions should not be used, because in this disease the coagulation time is usually prolonged and the blood platelets decreased. The transfusions of whole blood should be given at the peak of the rise—that is, every four or five days. The old method was to use citrate solutions and to give a large transfusion every ten days to two weeks, or sometimes a longer period elapsed between transfusions. So in most patients the blood dropped back to the original level or even lower and the good that was done was lost.

Transfusions in pernicious anemia are frequently a life-saving measure. When the blood cells get as low as five hundred thousand and the hemoglobin about 10 per cent, there is only one measure that is of value, and that is blood transfusion. I have recently seen a man whose red cells were 740,000 and hemoglobin 16 per cent. He was suffering from marked dyspnea, extreme weakness, and his thought and action were completely dissociated. He has received eight transfusions four days apart, and the hemoglobin is now 74 per cent, red cells 3,400,000; mentally and physically he feels as well as he ever did.

With this method of transfusing the hope is to not only bring them to a high level but to keep them within the normal limits. Blood counts should be taken weekly, and whenever the hemoglobin drops below 80 per cent and the red cells below 3,800,000, subcutaneous injection of whole blood 10 to 20 cc should be given daily. If this does not increase the blood elements then another transfusion must be given.

With the moderate amounts of blood injected there is little chance to depress the bone-marrow by overstimulation. It seems only logical to believe that the patient has a better opportunity to develop a remission if his hemoglobin is 80 per cent, red cells four million, than he has when they are 20 per cent and one and one-half million. Certainly the patient finds existence more to his liking, and were he the chooser transfusion would get the vote every time.

Transfusions are not without danger; even though all precautions as to typing have been taken a serious hemolytic reaction may occur. This seems to be more common after many transfusions have been given and after more than a week elapses between transfusions. This is the reason for suggesting that the use of whole blood be given by subcutaneous injection to keep the blood at the high level, and to use transfusion only when this fails.

Sign of Impending Hemolysis.—A sign of impending hemolysis in pernicious anemia is the appearance of petechial spots about the tourniquet before the needle is inserted in the vein. It is a sign of warning to be heeded, and the transfusion should be given with the greatest care, or perhaps better not given at all.

In spite of this ever-present danger transfusion offers the best hope of prolongation of life, sometimes for many years, of the alleviation of troublesome symptoms, and of in a few patients what seems to be a permanent cure. To gain this result, however, it is essential to use whole blood in moderate amounts every four to five days.

The Use of Antiseptics and Their Choice in Infection

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The continued use of innumerable chemicals as antiseptics admits an incomplete knowledge of the subject as well as the inefficacy of those in general use, and permits conclusions upon their evaluation and the formulation of requirements for an ideal antiseptic.

It may be concluded that many groups of chemicals exhibit some degree of antiseptic action; many, if not all, have been harmful equally to the infectious organisms and the animal tissues; they have failed to penetrate the tissues in most instances and, if absorbed at all, have exerted a toxic action upon the body cells; none has reached the site of infection unmodified; no solution, therefore, has destroyed the infectious organisms without untoward effect upon the tissues. The aim of antisepsis has been too wholly concerned with germicidal action. Insufficient consideration has been given the important function of supplementing the natural forces—*i. e,* to maintain or restore the normal metabolism of the affected part.

THE IDEAL ANTISEPTIC.

The requirements for an ideal antiseptic should be complete, rapid, unmodified absorption; mechanical protection; efficient and rapid germicidal action at the site of infection within the tissues; neutralization of toxic products; restoration and maintenance of normal metabolism; entire absence of toxic, irritating or other untoward action upon living tissues; applicability to the most delicate structures; ease in preparation and administration; and stability to heat, light, time, and climatic conditions.

ANTISEPSIS.

The study of antisepsis should be based upon a certain intimate knowledge of the fundamental chemical structure of the living cell and the metamorphoses which may, therefore, be brought about by processes of various types.

That the living cell is composed of protein, fat, carbohydrate, salts and water is common knowledge. The physico-chemical condition and the relationship of these constituents, together with the forces which control equilibrium during the rapid and continuous chemical changes concomitant with life, and direct these changes within the channels of normal function, are the important factors for consideration in this field.

Two points are outstanding and will serve

to explain abnormal chemical changes in the cells whether due to the antiseptic or to the toxins.

First, the protein, fat, carbohydrate and salts do not exist independently in the cell protoplasm, but are held by hydration and chemical affinities in intimate physicochemical union in the form of an emulsion.

Second, the continual chemical changes, both constructive and destructive, representing life and function in the living cell imply not only a continual material demand and supply which is furnished normally by the blood and lymph, but also a specific direction and control of the chemical reactions involved in cellular metabolism. The protoplasmic emulsion of the living cell, therefore, involves a state of unstable chemical equilibrium which is directed and controlled most probably by neuroelectrical forces.

Any substance, or condition, which disturbs this chemical equilibrium or its neuroelectrical state will inhibit or destroy cellular life.

All antiseptics owe their germicidal action to this property, but the cellular death has not been limited to the bacterial cell. It is obvious, therefore, that an ideal antiseptic should wield an independent action upon the bacteria and at the same time protect and restore the chemical equilibrium of the animal cell.

ANTISEPTICS.

The antiseptics may be divided, for convenience, into sixteen groups, viz.: Inorganic acids, alkalies, salts, metals, heavy metals, halogens, oxidizing agents, hydrocarbons, anesthetics, alcohols, aldehydes and ketones, organic acids, soaps, dyes, phenols, and colloids.

This classification permits a study of antiseptics chemically related and grouped according to the radical possessing the germicidal property.

Inorganic acids in water dissociate to a definite degree into hydrogen ions and radicals. The hydrogen ion combines with substances in the cell emulsion and thereby disturbs the chemical equilibrium. The degree of disturbance is directly proportionate to the hydrogen ion *potential*. When this is sufficient to produce death of the bacterial cell it causes death of the animal cell. Very dilute acids or boric acid which dissociate but slightly are, therefore, the only members of this group which may be employed as antiseptics and are obviously not ideal.

The alkalies depend for their action upon the affinity of the hydroxyl radical for the living cells. The consequent disturbance of equilibrium, however, is equal for animal and vegetable cells. Hence, only those of low hydroxyl *potential* are available as antiseptics. Lime water is the only representative, but has so slight a germicidal power as to be practically useless.

Among the salts used as antiseptics, those of the acid or alkali type, such as acid sodium sulphate, or disodium phosphate, have an action similar to acids and alkalies except that the two active radicals are potential. They are, therefore, less destructive and more practical. The neutral salts of strong acids and bases owe their action to either radical which disturbs the equilibrium of the cell emulsion by altering the state of hydration of the colloids. Sodium chloride, sulphate, nitrate, etc., may be used as antiseptics, but with the exception of the first are more employed as preservatives. Sodium chloride in isotonic or slightly hypertonic solution is very generally employed for continuous irrigation and dressing of infected areas for its cleansing power, ionic regulatory control, and slight antisepsis. Stronger solutions which are more germicidal will disturb cell equilibrium through excessive osmosis and replacement to a point of chemical stability or death. Sterile water or hypotonic salt solution will produce a similar disturbance, "crack" the emulsion, and kill the cell.

Salts of the metals depend largely for type of activity upon the metallic radical. They produce local disturbance by altering the state of colloidal hydration in the normal cell emulsion; in addition, the metals may be reduced to a negative valence, in which state they are systematically toxic.

The most popular members of this group are the bichloride, oxycyanide and iodide of mercury, the sulphates of zinc and copper, and the nitrate of silver, and should be used only where the above destructive action is desired.

The halogens, of which iodine and chlorine are the ones generally employed, are most efficient and rapid germicides. Their efficacy and rapidity of action is due to their extreme negative valence. They are immediately chemically reactive to all the substances with which they come into contact, and are therefore decidedly toxic or destructive to the existing chemical equilibrium. Their use as antiseptics is not advisable except in compound preparations in which their reactivity is guarded, as in sodium hypochlorite or Dakin's solution, dichloramine-T, and Eupad, and in iodoform, iodol, and similar combinations. Even with these clinical use has produced far from satisfactory results. Tincture of iodine, which enjoys such popularity as an antiseptic, is far from ideal and should not be so universally employed. Through the action of both the iodine and the alcohol the cellular emulsion is "cracked" to the point of absolute coagulation of the protein. It destroys the tissues immediately and limits its own action, simultaneously protecting and sealing the organisms and their toxins within the infected area.

Of the oxidizing agents, hydrogen peroxide and potassium permanganate are the materials of choice. As the term signifies they have the power of oxidizing organic matter, animal and bacterial cell alike. They are, for this reason, of limited value as antiseptics. They are for the same reason more useful as deodorant disinfectants.

Hydrocarbons deserve but passing mention as they have proven to be of value only as disinfectant agents. Gasoline, benzin, etc., produce a marked deleterious action upon the tissues probably due to their fat solvent power.

Of the alcohols, only ethyl alcohol need be considered. In high concentration it is efficiently germicidal, but coagulates albumin, has affinity for fats, and is dehydrating. It has been employed in skin infections, preferably in 50- to 70-per-cent solution, and in 30-per-cent in the alimentary canal. The lower percentage is distinctly inhibitory if not germicidal, and possesses the additional ideal features of rapid though limited absorption and power of neutralization of toxin.

Aldehydes and ketones, best represented among the antiseptics by formaldehyde and acetone, may be considered in a single group because of the dependence of their powerful germicidal action upon a common property which might be called simply "marked reactivity." They have strong affinities for many different substances and a group reactivity with the vitally important lipins of the animal tissues, together with a marked ability to alter the state of colloidal hydration. Although powerful germicides, their use as antiseptics is very limited and inadvisable, their untoward action upon tissues varying in degree from sensitization to actual dermatitis, dermal cellular death with systemic influence.

Organic acids constitute a rather large and loosely related group, which in contrast to the inorganic acids owe their action to the variable acid radical and not to the common possession of the hydrogen ion. Their chemical affinities, their resultant action and value are, therefore, different for each. A detailed discussion of the probable reaction of each acid radical is impossible here and unnecessary since none has any especial value as an antiseptic. Salicylic acid has been the one most persistently tried and found wanting.

Soaps consist of an alkali combined with one or more fatty acids, usually oleic, palmitic, or stearic. Their action is almost entirely cleansing, due to their emulsifying property and the liberation of hydroxyl ions in water. Their germicdial action, contrary to a long-held belief, is very slight. In fact, a survey of the value of soaps as antiseptics and disinfectants revealed the fact that soaps *per se* have no germicidal action, and that when

known germicides were incorporated in them only one, mercuric iodide (2 per cent, prepared by Parke, Davis & Company), proved efficacious. As an antiseptic, however, this would have the undesirable features of the mercurial compounds.

Dyes include many thousands of coloring materials, but have furnished comparatively few with proven bactericidal properties. It is in this field that probably more modern research has been conducted than in any other. Efforts to develop from them the ideal antiseptic have been based upon the assumption that their staining qualities, more or less selective for different cells and bacteria, could be utilized toward more specific action. Experience to date has shown, however, that the dyes such as malachite green, gentian violet, methylene blue, acriflavin, etc., have failed to meet the requirements. A dye plus a known germicidal agent has been the latest turn in the study with the production of mercurochrome, mercurophen, etc. They are attributed with possessing a chromophore constituent selective for cells and a germicidal constituent exercising the lethal action. From the principles hereinbefore recommended for the study of antisepsis the reasons for the failure of this group will be found.

Phenols from the earliest efforts in the field of antisepsis and disinfection have played an important part. Their action has usually been attributed to their power of coagulating albumin, but further study seems to indicate that their chemical affinity for aldehydes and ketones, normal constituents of cells held in proper balance, is a more important factor. Members of this group while efficient in destroying bacteria are equally deleterious to animal tissues, hence cannot serve as ideal antiseptics. Phenol and cresol, as well as the modified preparations lysol, kreso, izal, creolin, etc., have an irritating and toxic action and have come to be used almost entirely as disinfectants. Picric acid is to be considered in this group, its disadvantageous destructive properties outweighing its efficacy in the treatment and prevention of infection.

Colloids have continuously given the greatest promise of approach to the ideal antiseptic for reasons which may be made obvious. Those exhibiting marked germicidal power are practically limited to the metals and their salts, and are anionic, *i. e.*, negatively electrically charged.

The modus operandi of the colloid upon either the bacterial cell or the animal tissue has been very vague. Most authorities have attributed the germicidal action to specific precipitation of the metal by and into the bodies of the bacteria with a consequent interference with vital activity. This is probably part of the truth, but the cause of the precipitation, if this occurs, is the more important consideration. The available electric charges of the germicidal colloids are negative and may be neutralized with resultant precipitation by colloids of a positive charge. One may surmise therefore that the colloidal bacterial body most probably carries a potential positive excess which is directly neutralized by the negative colloid, with resultant chemical stability or bacterial death. The bacterial positive charge also influences the body tissues to a pathologic state by imposing this potentially positive excess upon their normal electrical equilibrium. It can be readily seen, therefore, that the negatively charged colloid, with its available charges as entities, not only attacks the bacterial cell independently but actually tends to correct the pathologic state in the animal tissues. How closely then do the negative colloids approach the ideal antiseptic! All of the requirements except one are fulfilled, and experience again has shown that the colloids of mercury and silver, but especially the latter, have given practical results which had never before been attained in antisepsis. Calomelol, colloidal calomel, is a powerful antiseptic, although the possibility of mercurial toxicity from its use has not yet been fully determined. Argyrol, protargol, collargol, cargentos, silvol, electrargol, etc., are some of the so well-known colloids of silver and have been used with excellent results in cases of local infection. They all

have dependable bactericidal action, are not irritating, have moreover a protecting and beneficial action upon the animal tissues, are non-toxic, and are easily prepared and applied. As before mentioned they lack but one quality: they are not absorbed by the tissues and are consequently limited in their action.

With all of the foregoing points in mind the authors began the study of antisepsis some ten years ago, and based most of their efforts upon the already proven advantages of certain antiseptics and the elimination of the causes for their failure to reach the ideal.

Obvious common-sense reasoning was compelled into the following channel: The germicidal agent of choice, because of entirely advantageous qualities as an antiseptic as well as bactericidal efficiency, must be colloidal. It should be an anionic colloid. The colloids of silver held the highest place among these. The whole problem then resolved itself into the finding of the reason for their partial failure and overcoming the one deficit, lack of absorption. The colloids of silver had been used in either watery solution or in ointments. It will be recalled that the authors consider the cellular protoplasm a colloidal emulsion containing both fat and water in intimate physico-chemical equilibrium. An aqueous solution therefore could not be absorbed by the tissues because water is not directly miscible with oil or fat. An oily or fatty preparation, as the ointments, would be equally unabsorbed for the same reason conversely applied. The vehicle for the colloidal silver hereupon assumed the important rôle in the research. This had to be an emulsion directly miscible with both fat and water, and a perfect and specific emulsion miscible with the fat and water and other constituents of the living cell. It should moreover, if possible, carry a negative charge in itself, be protective for the silver colloid, carry this with it in its absorption, and render the colloid more active in the control of normal metabolism and in germicidal power.

Some two hundred emulsions were studied, with all the available fatty bodies in various combinations with protein, carbohydrate, salts, and water. They were used to carry the various types of colloidal silver. The protected colloidal caseinate of silver seemed to be the most adaptable. Only one of these emulsions was found to possess the desired qualities. This was called "arkase," indicating the caseinate of silver in emulsion containing casein, lanolin, lecithin, carbohydrate, salts and water in proportions approaching as closely as possible those of the living cell. The absorption of this preparation is rapid and practically complete. The experimental and clinical results obtained with it, not only in the prevention and treatment of infections but in the restoration of normal cellular metabolism, have exceeded expectations. The activity of the colloidal silver was increased and the preparation had a higher potential negative charge than the aqueous solutions. The emulsion is perfect and permanent and protects the colloidal action indefinitely. It is a well-known fact that colloidal silver in solution rapidly loses its potency and becomes irritating. Arkase has shown unimpaired antiseptic non-irritating action over a period of five years. Applied to an infected area, the silver emulsion is rapidly absorbed and not only promptly attacks and eliminates the pathogenic organisms at the site of the infectious process, but protects the tissues and restores them to normal. This latter property is evidenced by several very interesting phenomena which have been lacking with the use of other antiseptics. Although no active analgesic is present, the pain and tenderness of the part attendant upon infectious conditions shortly disappears, induration due to round-celled infiltration and active congestion, ever present in local infection, evidently being unnecessary, is soon abolished, and healing takes place more rapidly and along normal lines. The last mentioned feature has been most interesting, advantageous, and instructive. Where destruction of tissue has taken place, the regeneration of cells to supply the

want is obviously controlled, most probably by the equilibrizing negative charge, so that there is never the overgrowth of connective tissue, exuberant granulation; the tissues of various cellular types regenerate equally, including the epithelium, and complete the healing with little or no scar.

Illustrative of the penetrative power of the emulsion of colloidal silver, erysipelas, the ideal infectious condition for proof of such action, is easily and rapidly controlled. The infection disappears and the parts return to normal within twenty-four to forty-eight hours. For the other features indicating its approach to the ideal antiseptic, burns and other severe traumata are absolutely protected against infection and heal painlessly with a minimum of toxemia, loss of tissue, and scarring.

It would seem needless to further attempt the fulfilment of the title of this article and definitely designate the antiseptic of choice in case of infection.

SUMMARY.

The basis for the study of antisepsis should include the consideration of the condition of and influences brought to bear upon the animal cellular tissue quite as much as the attack upon the invading organism. The ideal antiseptic should possess protective as well as combative properties, and above all should be non-destructive to animal tissues and exert its germicidal action independently at the site of the infectious process within the tissues. Otherwise the title disinfectant is more applicable than antiseptic.

Unfortunately the large majority of the so-called antiseptics fall into the last category. Boric acid, acid sodium sulphate, physiologic salt solution and the colloids of mercury and silver are the only representatives of the many members of the sixteen groups of antiseptics which possess qualities which should permit their use. Boric acid in saturated solution and physiologic salt solution may be used for their cleansing power for continuous irrigation or dressing, and although but slightly germicidal do not injure the tissues; in fact, the latter tends to preserve the normal balance of the cellular emulsion, thereby augmenting the natural powers of resistance. Acid sodium sulphate is a good antiseptic in a two-per-cent solution, but has a deleterious action in open wounds and is not penetrating. The colloids of mercury and silver, especially the latter, are antiseptics of choice. They possess all the requirements of the ideal antiseptic except the power of penetration of animal tissues and consequently do not reach the site of the pathologic process which they are intended to control. Argyrol, collargol, silvol, cargentos may be employed in local infections in ten- to twenty-per-cent solution, and protargol in about half this strength. Their action is less limited upon mucous membranes where absorption is a part of natural function than in infections of the skin. The specific emulsion containing colloidal silver caseinate in the strength of five per cent is used undiluted and is the antiseptic of choice in all local infections because it approaches most nearly to the ideal. It has been the author's practice during the last five years to use the silver emulsion in all local infections and traumata by direct application and gentle massage of the affected area and surrounding normal tissues one to four times daily. It will successfully control the local infection without surgical intervention, is non-irritating, non-toxic, soothing, and has the power to restore the affected tissue to its normal state and control cellular regeneration within normal channels.

Finally, colloidal sulphur and iodine should be mentioned. The former, although strongly anionic and capable of incorporation in emulsion, possesses but slight germicidal property.

Colloidal iodine deserves more than passing though prophetic mention because its marked anionic character and powerful germicidal action indicate an important place in ideal local antisepsis of the future. It has unfortunately been impossible to incorporate colloidal iodine in an emulsion possessing the property of local absorption without inhibiting the action of the iodine

and destroying the emulsion. The strong affinity of iodine for fats and proteins causes an immediate combination with these constituents in the emulsion, resulting in a practically inert compound and a "cracked" and useless emulsion. Further study will no doubt eventually evolve a method of handling this equally valuable agent in both local and systemic antisepsis.

REFERENCE.

"The Determination of the Value of Certain Soaps in Disinfecting Wall and Floor Surfaces," by John R. Conover, M.D., and John L. Laird, M.D., in *American Journal of Public Health*, July, 1922.

Indiscriminate Tonsillectomy in Children—Is It Justified?[1]

BY NATHAN P. STAUFFER, M.D.

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Is indiscriminate tonsillectomy ever justified in children?

Certainly not.

Is indiscriminate surgery justified any time?

Certainly not.

Why ask questions which deserve such obvious answers?

Is it true that there are laryngologists who believe all tonsils should be in bottles? If so, I do not know of one who has had the courage to proclaim it publicly.

Evidently, however, operations have been performed which created doubts in some physicians' minds. What has caused this impression?

I think there are about five reasons.

1. Indiscriminate selection of an operator.

Indiscriminate tonsillectomy implies operation without regard to the patient's needs, or health. The family physician is so busy, he seldom has time to observe various operators in their work.

Possibly there has been an indiscriminate selection of operators by physicians.

Probably he has sent the patient to an inexperienced operator, one having taken a six weeks' postgraduate observation course, or an interne who has taken out a dozen tonsils and proclaims himself an expert, and much benefit may have been promised by the operator which never materialized.

During the past year I have examined several hundred boys who have had T. & A. operations, with indiscriminate removal of uvulas and pillars.

Certainly this shows an indiscriminate selection of operators, and it was the fault of the family physician.

Tonsillectomy has suffered because many wayside experts have proclaimed it is a very simple operation, and will do it in their offices and send a patient home without a nurse, or any proper observation after operation.

Some of the worst hemorrhages I know have resulted in an uncontrolled patient.

I have heard of men doing tonsillectomies without any anesthetic, and permitting patients to roam around home without a nurse; this of course brings the operation into disrepute.

Tonsillectomy is a difficult operation, and one which requires years to perform skilfully and successfully, and if you want it properly done you must pick out not only an up-to-date, skilful enucleator, but one who can dissect thoroughly, and can pack the fossa or tie any bleeding arteries.

That tonsillectomy is one of grave danger, I need only to point to the report of six fatal cases by the Royal Infirmary of Edinburgh (Martin, *Journal of Laryngology and Otology*, February, 1922).

Dean in *The Laryngoscope* (20: 738: 1910) reports three fatal cases.

[1]Read by invitation before the Philadelphia County Medical Society.

H. L. Baum (*Annals Otology, Rhinology and Laryngology,* 28: 37: 1919) reports three fatal cases.

Tumbeer and Levison (*Laryngoscope,* March, 1923) report two cases, and W. F. Moore in his excellent résumé of 500,000 operations on the upper respiratory tract found they had had 202 cases of lung abscesses with a 50-per-cent mortality in operation, and in non-operative 24 per cent of deaths. Surely this illustrates the value of choosing a capable and careful operator for your patient.

This demonstrates the need of careful asepsis as some of these were infections.

II. Indiscriminate objections to tonsillectomy.

Just as there are indiscriminate selections so there are indiscriminate objections, such as "the tonsils have had some function, therefore should remain in the throat." As no one has satisfactorily proved that function to my mind, and as the adenoid usually atrophies after ten years onward, I believe the best time to remove them is somewhere between six and ten years, although Morris (Rochester) says he "prefers to wait until four years, because thereafter the tonsils cease to be a factor in the human economy, and become a rudimentary structure."

Another objection is that removal will ruin the voice. In order to prove this I sent 200 boys to Professor Scales (U. of Pa.) before operation, and had their voices tested before and after operation, and his report was that 97 per cent of them gained three major tones by the operation.

Still another indiscriminate objection is that having tonsils removed predisposes one to colds.

Others are "to remove them stunts the child's growth," and the last and least plausible is "their retention prevents tuberculosis," whereas it would seem to be the very opposite, judging by the results of the bacteriological findings of Dr. A. G. Morris, who reports (in *Laryngoscope,* September, 1923) that he found 39 cases out of a group of 3000, a low percentage possibly; but Crowe and Walthum and Rothbolz found 46 in a thousand; and Robertson 19 in 232 cases.

Tuberculosis of the tonsils has been carefully studied and reported by Turner, Piffle, Rethi, and McBride, and its relationship to lymphoid and cervical gland hyperplasia is noted by Gottstein, Grober, Sewaler, Nutikee, etc.

The report of Dr. Fisher and Dr. G. B. Wood is confirmatory of the possibilities of the tubercle bacillus entering the human system via the tonsil.

Therefore the presence of the tonsil rather adds to the possibility of T. B.

III. Indiscriminate selections for tonsillectomy.

Indiscriminate selections for tonsillectomy have been the cause of some failures in the operation.

1. Tonsillectomy will not cure speech defects.

2. Because a child has a persistent cough it does not follow operation on his tonsils will cure that. Yet I have been asked to do the operation on that score.

3. Because a child has snuffles, T. & A. operation will not cure a sinusitis.

4. If a child is unable to breathe freely or has a nasal twang, it is not always due to adenoids; frequently it is due to a deviated septum.

5. Tonsillectomy will not cure all cases of chorea.

6. A tonsil and adenoid operation will not cure a poor appetite due to an anemia.

7. Tonsillectomy will not cure every case of arthritis, although I have had a number of brilliant results from tonsillectomy, also some dismal failures. Some patients have had all their teeth removed for arthritis, without any benefit; some are worse because they cannot masticate.

IV. Indiscriminate operators.

This is the specialist who advocates removal of every tonsil. Probably some physicians have referred their patients to such a specialist, and thus that specialist has created the erroneous impression that

every specialist labors under the belief that the only good tonsil is an enucleated one.

In support of this, he says "you have never seen any one harmed by a good tonsil operation, whereas you have seen many serious complaints, as sequelæ of tonsillitis."

Rather than risk any chance of infection, he has advised every patient to have the tonsils removed, and thus his lack of discrimination has created a mercenary opinion of himself.

V. Conscientious objectors.

The previous class is almost as obstructive to good health as the "conscientious objectors to tonsillectomy"—the physician and also the expert who does not believe in any tonsil operation.

They are relics of the day when the town gossip whispered: "God put the tonsil there, and you should never remove anything nature meant you to have."

They will suffer the tortures of the Inquisition each year from attacks of tonsillitis rather than the pain of one operation.

DIAGNOSTIC PATIENTS.

You will realize there are several classes of patients, just as there are many classes of physicians. Many times I have heard patients say, "I would never consent to any operation; I would die first."

These are the patients who refuse *all* operations. They will consume bottles of pills or patent medicines. Just the opposite is the constant hospital seeker, the class who would do anything to be operated upon. Still another are Christian Scientists who come for treatment, and then report failure by the physician; and finally there are those who do their own diagnosing and prescribing.

I have known patients to go to their family physicians' offices and to the specialist, then to the osteopath, a chiropractor, and then the electrotherapeutist, and not tell either of their doctors of the visits to the others, thus diagnosing their own disease, and buying all the treatments to cure her or his trouble. This is indiscriminate tonsillectomy by the patient.

DISCRIMINATING TONSILLECTOMIES.

Before school inspection took place, many children were accounted dull and punished for mouth-breathing or deafness, until wide-awake medical inspectors found the dulness and deafness were not in the child but the guardian of the children, who refused to see the cause was insufficient oxygen due to adenoid or tonsil obstruction.

The pendulum then swung to the other extreme, and brought an era of prevention. Many parents seeing the valuable results of the tonsil and adenoid operation, took their children to a specialist with a request for operation, *without* consulting their family physician.

I have seen many patients demand it, because they had become impatient of their family physician treating their children's colds with no real relief, or cure; naturally they heard of their neighbors being permanently helped, and so became their own diagnosticians, and took their children to a surgeon.

If this surgeon refused to operate, they went to another and more accommodating specialist.

I have five simple reasons for tonsillectomy, and any parent or physician can tell if a child needs operative interference.

INDICATIONS FOR TONSILLECTOMY.

1. Mouth-breathers—obstruction due to adenoids, hypertrophied tonsils.

2. Frequent colds, bronchitis, adenitis, snuffles, etc.

3. Ear complications—frequent attacks of acute otitis media, or chronic purulent otitis media.

4. Cervical adenitis—enlarged glands due to an overworked adenoid and tonsil.

5. Tonsillitis attacks followed by arthritis, heart or kidney lesion.

Thank goodness the age of mysticism in medicine has largely passed away, and I say this in spite of the fact that our profession has not the courage to come out openly and fight the quacks who claim cures by all sorts of ridiculous methods.

Tell your patient if he does or does not need tonsillectomy and why.

Do not try to do it if you are not well qualified, for the patient will ultimately learn you have succeeded or failed; so will you lose, or earn his confidence.

Judging from the results I have observed in many throats, there are cases in which attempts have been made at tonsillectomy by operators who should not have undertaken the operation. Therefore I naturally question their judgment when they advise a tonsillectomy.

Indiscriminate tonsillectomy is never justified, but the physician who fails to see the need of and the benefit of an adenoid and tonsil operation has no one to blame but himself for the loss of prestige and patients. You will sooner or later discover this is the age of patients being their own diagnosticians. I am not saying it is wise or proper, but in this day a patient wants to be helped, and helped quickly, or he goes elsewhere.

Leidy and His Influence on Medical Science[1]

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When reference is made to the subject of Leidy and his influence on medicine it must not be thought the word "medicine" refers to drugs, or remedial measures other than drugs, or, for that matter, necessarily to any part of the practice of medicine. The subject is in reality his relationship to the science of medicine, or, in other words, investigations which, founded upon fact and accurate observation, enriched that science in the sense of knowledge. All knowledge is valuable, and it not uncommonly happens that an observation that seems to deal with what is called "pure science," pure in the sense of purity or accuracy of thought, or pure in the sense that it seems to have no practical application, is found subsequently to have a very definite and important bearing on the prevention, diagnosis and treatment of disease. From this standpoint Leidy's influence was great even if to the bedside clinician it was meager, but it may also be said that if practicing physicians had received the God-given ability to make observation as "pure," in the sense that it is accurate, as was that of Leidy, an immense amount of good would have resulted in his day and in our own.

Those of us who were so fortunate as to sit at the feet of Leidy as students of medicine appreciate to-day, more than ever before, the privilege we enjoyed, but I cannot avoid the thought that it is a subject for regret that no one let us know more of what his presence meant, or, if this was not feasible, that his faithfulness to his task of teaching human anatomy, as it had to be taught in those days, prevented him from leading us at least along the edges of the pleasant pastures in biology that he enjoyed and cultivated. If these thousands of medical men could have been instructed not alone in plain human anatomy but given at least a vista of what lies beyond, how much happier and more interesting lives could they have led. How many of his pupils saw in anatomy something more than bones and blood-vessels? How many, if they had only grasped the best phases of his mind, would have come, as he did, to the study of disease not as a thing which must be combated to earn a living, but a study in natural history in that disease depends upon flora and fauna or upon changes in living cells induced by other causes.

I, for one, feel to-day as if I had been with a great artist and never seen more than his tubes of paint when I might

[1]One of a series of papers read at a meeting under the auspices of the Academy of Natural Sciences of Philadelphia to celebrate the centenary of the birth of the great naturalist Joseph Leidy, December, 1923.

have seized the opportunity to see how he could turn the contents of those tubes into a picture of dazzling beauty. And this is not a mere figure of speech, because no one can look at Leidy's colored drawings of the flora and fauna of living animals without being impressed with the graceful beauties that he depicted, although to the ignorant those things are parasites and repulsive. I challenge any one to look at those pictures without giving an exclamation of wonder at the beauty they depict and at the skill of the artist. Unfortunately for the average man the story is now all told, but for Leidy it was only the beginning of a phase of development and life. Slight though his influence may have been on the ordinary medical student, who sat in the presence of the master without knowing where he sat, may we not hope that even the most obtuse must have unconsciously been touched with the spirit of that master and so learned from him the virtue of accurate observation and conservative judgment?

It may not be out of place before discussing further the influence of this remarkable man on the science of medicine to say something of his early days, because they were an earnest of his future career and also because they afford an object-lesson to those who would try to emulate his deeds. His nephew, Dr. Joseph Leidy, Jr., has given me the following interesting statement, and my thanks are due him not only for it, but for much additional assistance. He writes:

"Joseph Leidy told me himself that he was looked upon by his classmates when at school as a peculiar boy. He cared nothing for nor did he take any interest in their games. His penchant seemed to be collecting of natural history objects; he was particularly interested in plants and animals, and his interest at first was to collect beautiful objects in nature, although later on his interest extended toward knowing how plants and animals were made—just as he says other boys were interested in the construction of their toys. I have a book of drawings of different species of shells, which were made in 1833, with the Latin names attached—showing at the early age of ten an interest which I do not find recorded in the life of any other naturalist—from a large list I have reviewed. His interest in collecting plants resulted in long tramps, at distant places from home. His mother became disturbed at his late home-coming and determined to find a suitable person to accompany him. It so happened that the colored cook of the family had a son who was engaged in collecting herbs for a well-known physician in Burlington, N. J. This colored youth had some knowledge of field botany, and was selected on this account to accompany Leidy after school hours on his excursions. One field rich in wild flowers was where the old Reading Railroad station stood at 9th and Green Streets, and frequently he found his way to the Wissahickon Valley, to which later in life he directed the attention of botanists as the richest field in variety and species to be found in the confines of Philadelphia.

"Leidy told me he gathered the leaves and flowers, which he first kept between the leaves of old newspapers. Many of these became the foundation of the fine herbarium which at his death, or before, was given to the Botanical Department of the University of Pennsylvania.

"His interest in animal life began at the same time. Dr. Griscom used to relate how at the age of eleven, when making a professional call at his father's house, he saw the boy lying on his stomach, with a worm which he was dissecting pinned on a board, but I have heard Leidy relate that the first animal he dissected when a boy was a common barnyard fowl—and from this he dissected any animal he could lay hold of. At the age of nine years he collected silkworms with a brother. These he raised, and was always careful to remove the sick or those suffering from mould disease from the rest." (He refers to this in print in his Flora and Fauna.)

His first interest in mineralogy was

aroused by a lecture delivered by an itinerant lecturer when at school, who described to the boys different minerals—felspar, quartz, and various forms of crystals—how felspar and quartz and mica went to form gneiss, and of the formation of granite. His mental appetite was so whetted by this lecture that at the end of school hours he, with a number of boys, went to a dyke on a near-by street, where laborers were working. Here Leidy says he broke the rocks and stones, and carried home those which attracted him, and, to use Leidy's words, "thus began my first collection of minerals."

Having cleared the vicinity of his home of the various species of plants, he persuaded his father to purchase a botany for him, and after school hours was permitted to study the dry specimens of medicinal plants in the drug shop of a cousin, Dr. Napoleon B. Leidy, a graduate of the University of Pennsylvania in 1833.

You will see from all this that Leidy was born with a love of nature.

The other speakers have dealt with the personality of Leidy so thoroughly that I may not deal with it here save to point out that he loved work for its own sake, that he was wonderfully patient in observation, and that he utilized deduction and imagination only when he had exhaustively studied his subject. It has been said that a fault in Leidy was a lack of imagination, and that if he had not possessed this fault he would have gone further. It is true that imagination, given free rein, or guessing, may enable a man to reach a conclusion by a wild leap on rare occasions. But guessing was foreign to the very fiber of Leidy's mind, whereas deduction and reason were always on duty. In numerous instances Leidy made observations, reached deductions, placed them on record, and the rest of the world did not have the intelligence to utilize them.

Discussing the question as to how infection may occur, we find that Leidy in a lecture before the medical class of the University of Pennsylvania on October 11, 1859, spoke as follows: "I presume it is known to most of you that if a vessel of rain or river water, free from microörganisms, is placed in the window of a room during warm weather, in the course of a few weeks it becomes peopled with numerous minute plants and animals. The circumstance is usually explained by supposing that the germs of these minute organisms are incessantly floating with the dust of the air, and settling in the vessel of water they there find the conditions favorable, and become actively developed." No bacteriologist of to-day could discuss the distribution of pathogenic bacteria in better words than these, save that the vessel of water is to be substituted by the words "fluids of the body."

Again in the same address he points out that "germs are the minutest of solid particles," and adds that "there are certain specific living beings, as for example certain monads, which are so exceedingly minute that it has been estimated that 500,000,000 sometimes people a single drop of water;" and we now know that is the case with pathogenic bacteria, as for example the myriads of typhoid bacilli which render the urine of the patient cloudy.

A year ago in an address delivered to celebrate the centenary of the birth of Louis Pasteur, I pointed out that here in our midst there lived another whose career ran strangely side by side with that of Pasteur, namely, Joseph Leidy. Pasteur was born December 27, 1822, the son of a small tanner; Leidy was born September 9, 1823, the son of a small hatter. Both lived almost the same span in years; both were alike as to their physiognomy and spacious brain cap; both were alike as to their greatness and their power; both struggled with a poverty of cash and both reached the richness of achievement; both taught rudimentary things in order to keep the wolf from the door; and both were elected to professorships early and at about the same age. At the time Pasteur was interested in chemistry and crystallography, Leidy was interested in biology, the micro-

scopic and macroscopic parasites, mineralogy and paleontology; and was becoming the greatest living authority on the macroscopic parasites.

As Professor Chittenden of Yale said in his address on Pasteur in December, 1922, in this city, "Pasteur was primarily a chemist, and it was as a chemist that he opened the gates to paths which eventually led to new and wonderful conceptions in the science and art of medicine." Leidy was primarily a medical student and biologist; he also opened gates and paths which led to wonderful conceptions, and it is a noteworthy fact that Leidy in some of his work which influenced medicine antedated the work of Pasteur by many years. It was not until 1853 that Pasteur's work began to be biological, and it was in 1843 that Leidy made his first report which had a definite bearing on physiology and medical science. While a student of medicine he first observed the ameboid movement of white blood cells in Helix, a land snail, and described their projections. It is true that he did not fully grasp the significance of this observation, because in his charmingly frank way he writes: "I could not account for this phenomenon and concluded it was due to endosmosis or decomposition." Today we know that this ameboid movement is one of the essential phases of inflammation in warm-blooded animals, and that this power of the white cells to outwander results in one of the most important activities of the human body to oppose bacteria which have entered it.

Again, it is a noteworthy fact that although Hilton discovered the Trichina spiralis in man in 1833, and that Owen described and named it in 1835, it was in 1846 that Leidy found it in the hog, thereby revealing the source from which human infestation arises, with the further observation that he had found that exposing the trichina to the heat of cooking destroyed the vitality of the parasite.

In 1851 Leidy's epoch-making report on the "Flora and Fauna Within Living Animals" was made and published in the Smithsonian Contributions to Knowledge, but the observations on which this report was founded were carried out years before. In this report Leidy clearly recognized the importance of parasites in the production of disease, and in his preface used the following words:

"Within living beings, *i.e.*, within their cavities or the parenchyma of the organs, of course all the indispensable conditions of life exist, and consequently we cannot wonder at their being infested with other living beings adapted to their parasitic position. Nevertheless, although the conditions of life are necessarily ever present in living beings, yet these frequently do not contain parasites. There are many circumstances besides those essential to life in general which influence the existence or non-existence of such forms. One of the most important of these circumstances is the convenience or ease of access, or entrance to the living body infested.

"Within the living, closed, organic cell parasites very rarely, if ever, exist, because it is liquid matter only which can endosmose through cell-membrane, and, therefore, solid germs cannot enter, and hence the unfrequency of true entozoa in vegetables. Entozoa may and do penetrate through living tissues, but it is entirely by the mechanical process of boring.

"The intestinal canal of animals is most frequently infested by entoparasites on account of the ease with which their germs enter with the food.

"Aquatic animals are more troubled by entozoa than those which are terrestrial, because the water affords a better medium of access than the air.

"Terrestrial animals, on the other hand, are more infested by ectoparasites because their covering of hair, wool, and feathers is more favorable to their protection and reproduction. A low degree of organic activity and slowly digestible food favor the development of entoparasites, and hence they are more frequent in the relatively sluggish herbivora than in the carnivora. Comparatively indigestible food,

and such as contains but a small proportion of nutritive matter, from its long retention in the alimentary canal, favors the development of entozoic and entophytic germs more than that in which the contrary conditions prevail.

"Animals subsisting upon the endosmosed juices of the tissues of other animals, and of plants, are rarely infested by parasites, as in the case of the hemipterous insects, aphides, etc., because such food is necessarily free from parasites or their germs. Entozoa themselves, on this account, are not infested.

"On the other hand, if the liquid food be open to the air, parasitic germs may be readily introduced into the animal, as in the case of the common house-fly, which often contains myriads of a species of *Bodo*.

"Food swallowed in large morsels favors the introduction of attached parasites; hence these are frequently found in reptiles, and even in birds, which are, among the vertebrata, of the highest organic activity.

"Animals of feeble organic activity using solid food, which is very slowly digested, and contains little nutriment, are rarely free from parasites. This is the case with the coleopterous insect *Passalus*, and the myriapod *Julus*.

"Cooking food is of advantage in destroying the germs of parasites; and hence man, notwithstanding his liability to the latter, is less infested than most other mammalia. Did instinct originally lead him to cook his food, to avoid the introduction of parasites?

"Entozoa are more abundant than entophyta, because the power of voluntary movement favors them in their transmigrations, and renders them less liable to expulsion from the intestinal canal.

"In many animals entozoa and entophyta are almost never absent, and probably when in their natural habitation, and few in number, or not of excessive size, they are harmless, as observed by Dujardin in the introduction of his excellent work on Intestinal Worms.

"Many important diseases have been supposed to originate from parasitic animals and vegetables. The former are not the true entozoa, for these are too large, and may be detected by the naked eye, but they are considered to be animalculæ so small that they cannot be discovered even with the highest powers of the microscope. But, independent of the fact that the existence of such entities is a mere suspicion, none of the well-known animalculæ are poisonous. At various times I have purposely swallowed large draughts of water containing myriads of *Monas, Vibrio, Euglenia, Volvox, Leucophrys, Paramecium, Vorticella*, etc., without ever having perceived any subsequent effect.

"The production of certain diseases, however, through the agency of entophyta, is no longer a subject of doubt, as in the case of Muscardine in the Silkworm, the Mycoderm of Porrigo favosa in Man, etc.; but that malarial and epidemic fevers have their origin in crytogamic vegetables or spores requires yet a single proof. If such were the case, these minute vegetables and spores, conveyed through the air, and introduced into the body in respiration, could be detected. The minutest of all known living beings is the *Vibrio lineola* of Müller, measuring only the 36,000th of an inch, and the smallest known vegetable spore is very much larger than this, whilst particles of inorganic matter can be distinguished the 200,000th of an inch in size.

"I have frequently examined the rains and dews of localities in which intermittents were epidemic upon the Schuylkill and Susquehanna Rivers, but without being able to detect animalculæ, spores, or even any solid particles whatever. I have examined the air itself for such bodies, by passing a current through clear water. This was done by means of a bottle, with two tubes passing through a cork stopper; one tube dipping into the water, the other reaching not quite to its surface. By sucking upon the latter tube, a current of air passed through the former, and was deprived in its course of any solid particles.

Ordinarily, when the atmosphere was still, early in the morning, or in the evening, neither spores nor animalcules could be detected. When piles of decaying sticks or dry leaves were stirred up, or the dust was blown about by the wind, a host of most incongruous objects could be obtained from the air; none, however, which could be supposed capable of producing disease.

"To assert, under these circumstances, that there are spores and animalculæ capable of giving rise to epidemics, but not discernible by any means at our command, is absurd, as it is only saying in other words that such spores and animalculæ are liquid and dissolve in the air, or in a condition of chemical solution. That the air may be poisoned by matters incapable of detection by the chemist is proved by the emanations from such plants as the *Rhus vernix, Hippomane mancinella,* etc."

At first glance these words seem to indicate that Leidy did not believe in microscopic parasites. On the contrary he indicates that if proper means are used they will be discoverable.

I am not competent to attempt to decide who was the first investigator who, to all intents and purposes, gave the death-blow to the theory of spontaneous generation. In the recently celebrated centenary of the birth of Pasteur a statement which was emphasized more than any other was that one of his chief claims to fame rested upon his refutation of this theory. It is true that the investigations carried out by Pasteur helped to give it its final congé, and it is also true that these conclusions led him into the bacteriological field, with results industrial and medical which are of the utmost importance; but we must not overlook the studies of Schulze of Berlin in 1837.

Leidy duplicated the experiments of Schulze, using three different flasks and carrying the test from July, 1850, to December, 1851, and reached the same conclusions. The experiment consisted in heating a mixture of water and dead vegetable and animal matter to 212° F. and attaching to the container "a pair of Liebig bulbs, one of which contained sulphuric acid, the other a solution of potassa, and through these only could the exterior air have access to the interior. The apparatus was placed in a window where it received the full influence of light and the necessary temperature for the production of life, and the air within the vessel was daily removed from May until August by blowing through the H_2So_4 whereby it was deprived of moisture and particles. During all that time not even the simplest animal or vegetable forms were produced," while in an open vessel so exposed a host of organisms developed.

It was not until 1863 that Pasteur made his experiments with sealed and unsealed tubes containing bouillon, thirteen years after Leidy and twenty-four years after Schulze.

It is said that Lister was largely inspired by Pasteur's work to make his epochal discoveries in antiseptic surgery. One cannot avoid the thought that had earlier surgeons followed the views which Leidy advanced and carried them to a practical conclusion many thousands upon thousands of lives might have been saved, for I may add, for those of my audience who know not matters medical, that the determination of this issue, which at one time rocked the scientific world, was largely responsible for the development of asepsis in surgery and for our modern conceptions of infectious diseases. As a matter of fact two factors played a large part in the credit given to Pasteur: First, the world was at last ready to acknowledge the folly of the spontaneous generation theory; and, secondly, that Pasteur saw the practical deductions to be drawn. Perhaps it might be said that in this and other investigations Leidy was like Benjamin Franklin in his early work on electricity, and Pasteur was like Faraday in its practical utilization.

As illustrative of what appears to us to-day as weird conceptions as to spontaneous generation, I may call attention to the experiment of Crosse and Weekes

quoted by Leidy, in which they attempted the production of the so-called *Acarus Crossii* by the aid of electricity. It is not often that we find Leidy using as strong terms as he did in referring to this work. In a foot-note on page 12 of "Flora and Fauna" he uses these words: "The experiments of Crosse and Weekes appear to me exceedingly absurd; for in the first case, how were the carbon and nitrogen of the animal body to be derived by the play of a voltaic current upon a solution of silicate of potassa? If they previously existed in the water, was it not quite as probable that the ova of Acari were there also? Again, when the solution of ferrocyanide of potassium was made the womb of life by the electrical current, why could not the embryology of the new being be observed? Acarus is a highly complex animal, presenting a well-developed tegumentary, muscular, and nervous system, and a digestive, respiratory and generative apparatus. The gap between the inorganic world and the acarus is greater than that between the latter and man!"

In a lecture delivered to the medical class October 11, 1859, speaking of spontaneous generation, he said: "If from a pot of earth you told some one you had developed an egg and from this egg hatched an eagle, he would consider you a fool or a madman. If, however, you mention the fact that in your cellar for the first time in many years a group of mushrooms had sprung up, as if by magic, he would probably go into a learned disquisition as to the manner in which a concatenation of dynamical physico-chemical forces of nature operating on inorganic molecules had produced a polarity which resulted in the production of the peculiar organism denominated a fungus." Truly this is a piece of delicious satire.

The bearing of the determination that spontaneous generation does not exist has its impact in medicine because it emphasizes the fact that every infection is due to another infection—that is, no infection develops spontaneously. The deduction of course is that the conquest of infectious disease must be attained by preventing the infected one from being a nidus for the spread of the disease, and by the tracing of the infection to the source from which he in turn received it. By this means typhoid fever has become in many places practically non-existent, and this holds true of many other maladies.

It is remarkable that Leidy's oft-repeated observations of molds and fungi in crickets, etc., did not lead to more direct bacteriological work.

There is no fact so generally recognized to-day as that flies are disseminators of disease, yet such recognition may be said to be of recent existence. Nevertheless, Leidy in the Proceedings of the Academy of Natural Sciences in November, 1871, said that "at this time, during the prevalence of smallpox, he was reminded that he had entertained the view that flies were probably a means of communicating diseases to a greater degree than was generally suspected. From what he had observed in one of the large military hospitals, in which hospital gangrene had existed, during the late rebellion, he thought flies should be carefully excluded from wounds. Recently he noticed some flies greedily sipping the diffluent matter of some fungi of *Phallus impudicus*. He caught several flies and found that on holding them by the wings they would exude two or three drops of liquid from the proboscis, which, examined by the microscope, were found to swarm with spores of the fungus. The stomach also was filled with the same liquid, swarming with spores." With our present knowledge it seems beyond belief that this observation was not seized upon as of the greatest import, yet I venture to say that every one of my auditors will recall the days when the fly was allowed to roam at will in great numbers over the food of even the well-to-do, and to creep all too often over the lips of the patient apathetic from typhoid fever. Leidy presented his facts, but failed to emphasize their general import-

ance in such a way as to attract attention, and no one apparently had the initiative to start what is now called the "campaign to swat the fly."

Again we find this interesting observation, with a practical deduction, which also seems to have lacked general recognition, possibly because it was reported to a group of men devoted to science in distinction from men who, practicing medicine, would naturally have made a practical application of the fact. Thus in 1873, before this Academy, he showed a mouse, with whitish masses adherent to the ears, side of face and nose, which had been captured in the Children's Wards of Blockley Hospital. Leidy reported these masses were a fungus, a Torula or Cidium resembling that found in aphtha, and then with his usual caution said: "Perhaps the disease in mice is the result of feeding upon articles imbued with adherent portions of aphthous matter from the mouths of children, and perhaps also the latter may become affected from diseased mice contaminating the food and drink used by the children." Here is then an early contribution to the spread of infection by rodents now recognized as the chief means of spread of the most vicious of diseases, such for example as plague.

But Leidy did not confine himself to researches on the lower animals. He often studied factors affecting human beings as well. Other speakers have already dealt with his work as a helminthologist adequately, so I will not deal with this very important topic.

As early as 1847, his cousin, then the coroner of Philadelphia, appointed him coroner's physician, and he was called upon to determine whether certain blood-stains in a murder case were human or those of a chicken. As a result of his studies he testified that while he could not swear that they were human blood-stains, he could state that they were not due to chicken blood.

Again we find in the Medical and Surgical History of the War of the Rebellion, p. 109, *et seq.*, 310-311 *et seq.*, 2nd part, a statement by Woodward that Leidy's autopsies constitute by far the most important contributions to the pathological anatomy of the non-ulcerative form of intestinal inflammation made during the war.

In 1886, before the College of Physicians of Philadelphia, he reported on anchylostomum duodenale in the domestic cat and advised medical men to be on the lookout for infection in mankind, adding these pregnant words: "The finding of this parasite in the cat in this country renders it probable that it may also infest man, and it is probably one of the previously unrecognized causes of pernicious anemia." It is not needful to call attention to the fact that millions of human beings have been found to have this infection in recent years, and that hundreds of thousands of lives have not only been saved but made useful by the war waged against this parasitic infection. Here again it would appear that notwithstanding the universal confidence of all men in Leidy's powers of observation and accuracy of statement, his views seem to have fallen upon stony ground, for many years elapsed before the importance of this subject was recognized.

As late as 1891 he published papers discussing the introduction of parasites into the United States by different races of immigrants, pointing out that the trichinæ spiralis appeared in hogs in this country after it had been found in man in England, that the liver fluke was introduced by Chinamen, and that the Guinea worm found its way to our tropical areas by negroes from Africa. These points, made in the Proceedings of the Academy of Natural Sciences in April, 1891, were only suggestions, because in the same report the presence of flukes in a considerable number of wild and domesticated animals was recorded, leading him to the belief that if such importation occurred it must have taken place many years before.

Many years ago I served on a committee of the Pathological Society of Philadelphia to investigate the prevalence of disease in animals slaughtered in the abattoirs of Philadelphia. As it was in the middle "eighties" the question of tuberculosis did

not loom as large then as it did later, but I well recall that in the discussion of the report to the Society, Leidy remarked that for several decades he had made a habit of frequenting the Twelfth Street market somewhat as a purchaser, but possibly more as a naturalist, and that in all that time he had found only one instance of grave disease in an internal organ of a food animal, and that was a cancer involving the liver of a turkey. I also recall that he added with that quiet smile of his that so far as he knew there was no reason why such a liver should not be cooked and eaten.

This anecdote as to his peregrinations in the market place is an interesting illustration of the fact that Leidy saw things of interest everywhere he went. A flower or a vegetable in the market stall gave him a story that he could get only in far-away fields and gardens.

It is not possible to discuss in detail or even to mention by name the various subjects, closely connected with medical science, which were the results of Leidy's unflagging industry. In 1846 he reported to this Academy on the vocal cords as membranes, and in 1847 recorded his researches on Articular Cartilage. As early as 1853 he translated a Pathological Atlas with notes and comments. In 1851 he made two reports on experiments in transplanting cancer, and in 1858 he recorded his observations on intestinal absorption and presented researches on death due to chloroform to this Academy. In 1877 he studied the contamination of drinking-water as a source of disease. In 1882 he contributed to Holmes' System of Surgery the articles on parasites and the treatment of the effects produced by venomous serpents and reptiles, and in the same year that upon intestinal parasites to Pepper's System of Medicine. In 1883 he recorded his studies on the temporal bone, described the attic for the first time, and took issue with Huxley on the various centers of ossification. In the THERAPEUTIC GAZETTE of June 15, 1886, he wrote on the Pathological Importance of the Lower Forms of Life. In 1889 his book on Human Anatomy appeared with its terms anglicized and simplified, a protest against the use of personal names for anatomical things. Again in 1890 he presented to this Academy his Researches on Ticks, which parasites have since proved such important factors in the transmission of disease.

I have been told that when on his deathbed Leidy noticed that the carpet in his room was patterned with flowers. He remarked that he could not understand why this should be, for who could think of walking on flowers. Leidy regarded flowers not as most mortals do, only because they please the eye. He saw in each a story of natural history. The petal, the pistil, the leaf all told him a double story of life and development as well as beauty. How many of us poor mortals pass through life ignorant of all the charm and wonder that Leidy enjoyed. To see in every living thing, or in one dead for centuries, an interesting story, or to put it otherwise, to see in everything living the possibility of its developing like a beautiful fan on expansion. Like the bee he passed from what to him was a flower to another flower, and in each case drew his fill of the nectar of nature's wonders.

If those of us who were so fortunate as to sit at his feet as students could only have grasped more thoroughly what Leidy personified how blessed would have been our after lives. Gentle and learned, kindly and wise, accurate and truthful, modest yet strong, animated by no thought save that of interest in his task, he now, more than thirty years after his death, is a living presence in the minds and hearts of those who love science for science sake, and will live in the minds and hearts of those who follow after us. In this hurly-burly world, when nearly all men are self-seekers more or less, and chiefly more, the memory of Leidy and his labors is a benediction to all those who know enough to appreciate, not alone what he did, but the example he unconsciously set before all men.

Editorial

ETHYL CHLORIDE FOR MINOR OPERATIONS IN CHILDREN.

There can be no denial of the fact that the best anesthetic for use by inhalation has not yet been found, although it is true that nitrous oxide when skilfully given fairly closely meets most demands. Ether also, if skilfully given, is, taking it all in all, the most generally used surgical anesthetic at the present time for major operations. Practically all surgeons and anesthetists to-day begin ether anesthesia after the patient has been rendered unconscious by nitrous oxide. A few, because of the difficulty inherent to the transportation and skilful use of nitrous oxide, precede ether by ethyl chloride, but it is not to be forgotten that while the death-rate from nitrous oxide is practically *nil* (being less than 1 in 100,000), the mortality under ethyl chloride is about equivalent to that of chloroform, or one in two thousand.

As a result of coincidence, accident, or what might be called "hard luck," there is a very extraordinary variation in the number of accidents which occur in different clinics with different anesthetics. Thus, in a recent issue of the London *Lancet,* Rose, a dental surgeon of London, records his experience with ethyl chloride in children. He states that he has used it eighteen years and administered it to upwards of 15,000 patients without a fatality, emphasizing that his remarks apply only to its use in children, but believing that much that he has to say applies equally well to adults.

These points are important, because it is well known that children do not take nitrous oxide as well as adults, and this leads Rose to believe that at the present time the question of the best anesthetic for an adult is nitrous oxide. He admits that opinions are not all favorable to the use of ethyl chloride, but he cannot avoid taking the view that the unfavorable opinions have been based upon the results following the use of unsuitable or imperfect apparatus, or where the operator or the administrator has taken unusual risks.

As his experience is largely composed of out-patients at a dental hospital there has been practically no selection of cases; the anesthetic having been used in all nationalities and whether the patient was of good or poor physique, and at ages varying from eighteen months up to fourteen years. Some of his patients had pronounced cardiac murmurs; others serious pharyngeal obstruction from tonsils or adenoids, and, as he says, in countless other ways have not by any means been ideal subjects for any anesthetic.

He uses for administration a small rubber bag with one opening by which it is connected to a face-piece with a stop-cock intervening. Inside the bag is a clip which holds a piece of sponge and leading to this a tube down which the ethyl chloride is sprayed. A little plug closes its opening when the bag is charged. This apparatus is designed for to-and-fro breathing into the bag, as Rose considers that the old way of breathing with an admixture of air is obsolete and unsatisfactory. Under these conditions a very few breaths are necessary to attain complete anesthesia and recovery is quick.

The dose sprayed into the bag in children will vary from 2 to 5 cc, the latter amount being sufficient for a boy or girl of thirteen or fourteen, and, therefore, he considers that ethyl chloride is a serious rival to nitrous oxide. One disadvantage of ethyl chloride is its odor, which sometimes makes children struggle or hold their breath.

The drug should be given when no food has been taken. Rose employs it always with the patient in a sitting position in a dental chair, a nurse standing in front to control the patient's hands and to prevent him from slipping down. A gag is then placed between the teeth as when nitrous oxide is used, and the inhalations started, the full effect to be recognized by deep rhythmic and stertorous breathing, the

pupils becoming fixed and dilated, with loss of reflexes.

Generally speaking, Rose states that after the third stertorous breath the patient is ready for operation, and a useful period of quiet anesthesia results.

He again emphasizes the great importance in administration of the complete exclusion of any extraneous air, stating that leakage or an imperfectly adjusted face-piece means a long induction and uncertain and noisy anesthesia. Generally speaking the quicker the patient goes under the better, although this must not be taken to indicate that the results are proportional to the amount of the dose, and there are certain risks in overdosage.

Of the difficulties which sometimes arise, he mentions holding the breath, which can usually be avoided by using a small quantity of spray at first; forward sagging of the head, which can be overcome by an assistant; laryngeal spasm, which requires that the face-piece must be removed until normal breathing has been restored; syncope, which is indicated by pallor, since ethyl chloride usually produces a rosy color. He believes that this should not cause alarm if the breathing continues regular; stopping of the operation temporarily and inversion of the patient for a few seconds will produce restoration. Occasionally there is obstructed breathing from the tongue or adenoids. Relief is obtained by the forefinger of the operator pushing down the root of the tongue and drawing it forward, when breathing at once begins again. Rose claims that vomiting is a troublesome symptom only if the patient has failed to abstain from food.

INTRAPERITONEAL INJECTIONS.

Within the last few years the introduction of normal salt solution or solutions of glucose into the peritoneal cavity has been quite largely resorted to, particularly in the treatment of children who are suffering from what used to be called cholera infantum and other conditions associated with great loss of body fluid or with acetonemia, anywhere from 100 to 300 cc being given through a needle, under proper aseptic precautions, just below the navel, care being taken that the needle enters straight and not to one side.

So, too, in young children, intravenous injections have been made through the superior longitudinal sinus owing to the difficulty of getting into a vein.

Other clinicians have resorted to the subcutaneous or intramuscular injection of blood, or blood-serum, which has its particular usefulness in the treatment of hemorrhagic disease, such as melæna neonatorum.

The advantages of the intramuscular or subcutaneous injection lie in the fact that there is not the danger of hemolysis and agglutination in the blood stream which follows intravenous injection, and obviously one hesitates to resort to the superior longitudinal sinus for reasons which it is not necessary to discuss.

Recently Sandsby and Siperstein have used citrated blood for intraperitoneal injection and found that it was promptly absorbed, and that the red cells from the donor promptly entered the circulation of the donee. They claim that in some instances they were able to differentiate the cells of the donor from those of the recipient, and they found that the injected blood seemed to have no toxic properties.

In their clinical work they give the injections in the morning before the patient has had any food, but it is to be noted that they are careful to see that the blood of the donor and the donee are matched, and furthermore, that cross-grouping is to be practiced. In other words, it would appear that for intraperitoneal injections it is just as important that the question of agglutination and hemolysis should be decided as when an intravenous injection is used. They apparently do not believe that the citrated blood should be kept for any length of time, but immediately used, although, as our readers know, one of the advantages of the so-called citrate method of trans-

fusion has been thought to lie in the fact that the blood might be kept for many hours and transported great distances.

They have not only resorted to this method in children, but they have also employed it in adults, as, for example, in the case of a woman with a fibroid uterus suffering from severe secondary anemia, the intraperitoneal injection permitting surgical interference to be promptly undertaken.

As intraperitoneal injection is a much simpler proposition, so far as its technique is concerned, than intravenous injection, it bids fair to be more generally used unless future reports indicate that it has distinct disadvantages.

THE PROPER DOSAGE OF THE SALICYLATES.

Forty years ago the late Dr. Horatio C. Wood, Professor of Therapeutics in the Medical School of the University of Pennsylvania and Editor of this Journal, taught his students that in the treatment of acute articular rheumatism it was essential that large doses of the salicylates should be given if success was to follow their administration, and that if such large doses were given in what was thought to be acute articular rheumatism for a period of five or six days with no improvement, it could be decided that an error in diagnosis had been made and that some other form of arthritis was present.

Since that time other writers have not expressed the same confidence in the specificity of this drug, but our personal experience leads us to believe that Wood was correct in the latter view, but it is certainly true that the salicylates are commonly given in doses which are quite inadequate to produce results. Thus, it not infrequently happens that as small quantities as ten grains three times a day of the salicylate of sodium are given, either with the thought that this is an efficient dose, or because the physician is afraid that the digestion will be upset by larger quantities. If this fear is substantiated by results when larger doses are given, then the physician is practically forced to give up the employment of this remedy because of his recognition that such small doses are almost inadequate.

Another point of interest is as to whether the salicylates if given in any dose protect the endocardium against the invasion of rheumatic infection. We believe that it is generally considered here, and in England, that they have no such direct effect, although if they succeed in shortening the length of the illness, they indirectly protect the heart by decreasing the period during which the infection can exert its evil influence upon the endocardium.

In a recent issue of *La Presse Médicale*, Daniélopolu contributes a paper upon "The Treatment of Acute Articular Rheumatism by Massive Doses of the Salicylates." He writes as Professor of Clinical Medicine in the University of Bucharest, and contributes quite an exhaustive paper upon this subject. He is an earnest advocate of the administration of large doses, and while recognizing that such quantities may produce untoward effects, he nevertheless believes that if success is to be achieved, these doses are imperative.

After pointing out that the quantities which he recommends may produce symptoms resembling those commonly described under the word "acidosis," he also emphasizes the fact that the use of bicarbonate of sodium in association with salicylate is essential.

For many years English physicians, as well as American practitioners, have recognized that this combination increases the efficiency of the salicylate in producing the desired therapeutic results. Daniélopolu apparently does not believe that the bicarbonate of sodium is so much a remedy for the rheumatism, as he thinks that by its influence as an alkaline substance it prevents disagreeable symptoms and protects the patient against acidosis. Heretofore many physicians have thought

that they were pursuing a correct course if they administered the same number of grains of the bicarbonate as they did of the salicylate of sodium, but Daniélopolu advocates giving twice as much bicarbonate of sodium, and, furthermore, advises doses of the salicylate which are very large indeed, believing that if the stomach will not tolerate the doses that the disease requires, intravenous injections should be resorted to; and this is the more possible in view of the fact that these drugs are now placed upon the market in ampoules in solution form for intravenous injection.

To illustrate the plan which he advises, we print below the table that he gives for the use of these two substances in rheumatism in the adult, pointing out, however, that while he considers 8 grammes as the starting dose for an adult, for a child between eight and twelve he believes 5 grammes to be proper, and that in a child below eight, 2 to 3 grammes should be administered.

Mild Form.

	Salicylate. grammes.	Bicarbonate. grammes.
First three days	8	16
4th to 6th day	10	20
7th to 9th day	12	24
10th to 12th day	14	28
13th to 20th day	16	32
21st to 24th day	14	28
25th to 28th day	12	24
29th to 32nd day	10	20
33rd to 36th day	8	16
37th to 40th day	6	12
41st to 42nd day	4	8

Intense Form.

	Salicylate. grammes.	Bicarbonate. grammes.
First three days	8	16
4th to 6th day	10	20
7th to 9th day	12	24
10th to 12th day	14	28
13th to 15th day	16	32
16th to 18th day	18	36
19th to 28th day	20	40
29th to 32nd day	18	36
33rd to 36th day	16	32
37th to 40th day	14	28
41st to 44th day	12	24
45th to 48th day	10	20
49th to 52nd day	8	16
53rd to 56th day	6	12
57th to 60th day	4	8

It will be noted that he advocates ascending doses, and then, having reached a maximum, gradually diminishes them.

Evidently from the table which he gives, his experience would lead him to differ from that of Wood and others, since he continues the salicylate over a very long period of time: thus in the severer types he uses it in one dose or another for as long as two months, presumably for the purpose of preventing relapse, which as we all know not infrequently occurs. He administers the drug throughout the entire twenty-four hours, giving it every two hours during the day and every four hours at night, and, apparently with the idea of aiding the bicarbonate in preventing symptoms of acidosis, advocates the free administration of starches and sugars as antiacetone agents.

Finally, concerning his belief as to the use of salicylates in the presence of cardiac disease already in existence, he expresses the opinion that the salicylate is not contraindicated so far as the heart is concerned.

Last of all, he makes the rather remarkable statement that should the heart seem to suffer it is wise to meet this indication by the use of quinine or quinidine. We would feel inclined to warn against the use of quinidine, certainly unless its action can be studied by means of the electrocardiograph, and we are in doubt as to how quinine can act advantageously under these circumstances.

THE BLOOD AFTER BURNS.

Every physician of large experience is familiar with the fact that extensive superficial burns produce systemic symptoms which seem to be entirely apart from the local lesions. It has been thought that this was due to the absorption of certain toxic substances from the damaged surface, and the Great War offered a number of opportunities for studying this important problem.

An interesting communication upon this

subject has recently been made to the *Archives of Internal Medicine* by Underhill, Carrington, Kapinow and Pack, in collaboration with a number of other workers. These clinicians believe that such burns result in distinct concentration of the blood, and that the patient may be treated advantageously by the physician who recognizes this fact and who provides fluid to compensate for that which has been lost from the tissues. They seem to prove their theories, and they suggest that the important part of the treatment, aside from the local applications, is the free use of fluids by the mouth, or presumably by the bowel, and the application of paraffin dressings, by means of which excessive exudation of serum from the surface of the burn does not occur.

As an evidence of blood concentration they find that when it is moderate the circulation is maintained close to its normal limits and that the temperature rises above normal, but if the concentration is increased so that it is marked, the temperature falls rapidly to a point far below normal and death occurs. These changes in temperature would seem to be chiefly associated with the condition of the patient within a few hours after the accident, the febrile movement occurring many hours later being probably due to septic absorption when the burned surface has become infected.

THE TREATMENT OF AMEBIC DYSENTERY.

The discovery that emetine given hypodermically was more efficient in the treatment of amebic dysentery than the old-fashioned method of administering ipecac was naturally considered a great advance in medicine, the more so as the ipecac when given by the mouth and passing through the intestine could only influence those amebæ with which it came into direct contact, whereas the hope has been that when emetine is given hypodermically it will be in the blood stream and so influence more or less the amebæ which may be lying partly protected by exudate or secretion in the floor of the ulcers.

As our readers well know, the hydrochloride of emetine fails in a certain large proportion of cases, just as does ipecac, patients seemingly cured often undergoing relapse. For this reason, pharmaceutical chemists have endeavored to find some product which would act better, as, for example, emetine-bismuth iodide injected intramuscularly daily, as much as 10 grains of emetine and 60 grains of emetine-bismuth iodide being given together in the course of a twenty-day treatment. It was found, however, that patients objected to this treatment when carried out by Wilkinson and Bluett-Duncan, and so an attempt was made to use both the hypodermic needle with 2 grains of emetine daily, which is certainly a very large dose, alternating with 30 grains of ipecac powder. Out of 358 cases treated by emetine and emetine-bismuth iodide, 99 were presumably cured after the first course of treatment, or 28 per cent, but 259 relapsed, or 72 per cent. Of these 259 cases, 183 received a second course; of these 36 were presumably cured, equaling 20 per cent, and 147 relapsed, equaling 80 per cent. Of the 147 cases which relapsed, 59 received a third course, of which only three were presumably cured, or 5 per cent, and 56 relapsed, or 95 per cent. Of those 56 who received a fourth, fifth or sixth course of treatment, in all instances the relapses were 100 per cent.

Such results are certainly discouraging, although it must be remembered that the patients were chronic cases. But Willmore, physician in the Tropical Section of the Ministry of Pensions Hospital at Orpington, England, contributing to Proceedings of the Royal Society of Tropical Medicine and Hygiene for May, 1923, emphasizes the great difficulty of determining when a cure has actually occurred, and cites one remarkable case in which the stools were examined ten times in twenty-one days without the amebæ being found,

and an examination with the sigmoidoscope was also negative. Nevertheless the patient was started on a course of emetine-bismuth iodide three grains daily, but on the sixteenth day, when he had taken forty-five grains, an acute attack of dysentery supervened, with blood, mucus and numerous amebæ in the stools.

In explanation of the difficulty of curing some cases, Willmore states that, as he understands it, the essence of the pathology of amebic dysentery is a primary degeneration of the submucous layers of the large bowel due to their digestion by a proteolytic enzyme secreted by the amebæ in its vegetative state. It is not an inflammation and no antibodies have yet been demonstrated in the blood, but a certain amount of cicatricial tissue eventually occurs, resulting in the amebæ becoming "dug in" in nests, where they are protected against antagonistic substances in the bowel, in the blood, or in the lymph. This is an explanation of why it is that emetine products are so successful in early cases and almost futile in chronic ones, and explains the fact that all other remedies are often impotent, and surely a host have been employed, such as napthalene tetrachloride, oil of chenopodium, creosote, and other more or less active substances.

One of the difficulties in the use of emetine by the mouth, or for that matter of ipecac by the mouth, is that it has to travel many feet of the alimentary canal before it reaches the part of the bowel which is chiefly affected, and therefore Willmore asked Martindale, who is so well known as a pharmaceutical chemist because of his work in Martindale and Westcott's Extra Pharmacopœia, to devise some product which would be more likely to reach the area of the intestine chiefly involved. Martindale has succeeded in producing a solution of emetine base, 1 grain in 2 drachms of olive oil, intended for rectal administration. These 2 drachms were added to 4 to 6 drachms of ether and 8 ounces of olive oil, and injected into the bowel after a preliminary washing out, the buttocks being elevated. Such injections were given every other day for six to twelve in a course, and produced no untoward effects and seemed to be definitely advantageous.

Willmore states that the odor of ether appears on the breath about five minutes after starting the injection. At times he has used this mixture through an appendicostomy opening, the emetine not only acting locally under these circumstances, but also after absorption, which seems to be proved by the results of his work. He also states that these injections are not unduly irritating, as is proved by the fact that they can be retained by the patient from twelve to twenty-four hours.

A number of other preparations depending upon emetine for their activity have also been tried, but the conclusion seems to be that emetine periodide given after food in plain gelatin capsules gives the best results, or to use Willmore's words, it is by far the most effective and at the same time the least toxic of all the emetine preparations which he has tried, and may well supersede emetine-bismuth iodide as a standard administration. He advises an intensive course of 90 grains, to be given in the short period of fifteen days, and repeated if necessary after a ten-day interval, which is a very much more active form of treatment than can be carried out with emetine hypodermically or with emetine-bismuth iodide.

We present in our Progress Columns the conclusion reached by Willmore in the Transactions to which we have referred.

FOOT DISABILITY.

From the standpoint of eligibility for military service the examination of several million men showed an astonishingly large percentage disqualified because of disability incident to improper weight-bearing by their feet. As a result of the knowledge

of conditions thus gained there has been an increasing amount of attention devoted to the strengthening of weak feet, and in particular there has been much written concerning the prevention of this condition by education in early childhood.

Geist (*Surgical Clinics of North America*, October, 1923) maintains that, in marked contrast to the hand, which has become highly specialized, the foot is from the developmental standpoint an unfinished organ and is a makeshift. Moreover, in the process of specialization this makeshift has been somewhat perverted in its purpose by adding to it stiff soles and a leather encasement, and by forcing it to walk upon hard surfaces.

Geist makes a report on 781 consecutive cases, finding that in but one-third of these was there to be observed what is called a weak foot, whilst in the other two-thirds there was a distinct and localizable pathology.

As to the weak foot he holds the symptoms, which come on slowly, are characterized by pain, usually on both sides, worse on standing; multiple tender points; and, in the early period at least, comparative comfort at night. The weak foot is usually caused by ill-fitting shoes, by rapid increment of weight, or unduly prolonged weight-bearing after an illness. The load is either wrongly applied, or applied to structures too weak to bear it.

The curative treatment lies in strengthening the muscular and tendinous supports, and in seeing that the weight is adequately carried by a properly fitted shoe. The one suited to the majority of cases is the Munson army shoe, and tilting on the inner side is helpful during the early stage of cure, this being accomplished by a heel and toe wedge inserted in the sole. By this means, exercise being particularly stressed, about 30 per cent can be cured.

The arch support may be needful at times, but according to Geist should be prescribed with the same reluctance that one feels in ordering a crutch to one who might do without it, or in prescribing morphine to one who suffers pain otherwise unrelieved.

The author records 39 cases of chronic arthritis of the feet; the average age of these patients was thirty-seven years. Most of them were women. The symptoms are similar to those of weak feet. The characteristic features are pain at night and inability to wear an arch, the latter increasing the distress. The outlook as to permanent cure is less favorable than in the case of weak feet. The treatment is eliminative, supportive, muscle strengthening, the application of full-sized shoes, with felt pads, and as a helpful measure, treatment by sunlight. Also, and of distinct importance, removal of focal infections.

There are records of 80 cases of weak foot with arteriosclerosis. The average age of these patients was fifty years, and there was complaint of night pain, of frequent cramps, the feet were cold, and often numb and swollen. The pulse of the foot arteries was feeble or absent. Hot and cold douching, warm covering and sunlight offer the most promising means of treatment.

As to the weak foot following an attack of gonorrhea, the author believes the ablation of the focus of infection is the most important method of treatment.

He reports twelve cases of accessory scaphoid, which he states occurs normally in from 12 to 16 per cent of all feet and may be unilateral, bilateral, large or small. It may cause no pain, or give rise to so much distress as to require operation. The diagnosis is made by *x*-ray and the cure is accomplished by excision.

There were eight cases of foot exostosis and 14 cases of acute foot strain. For this latter condition Gibney strapping affords complete relief.

There were 20 cases of spurs of the os calcis; these are not infrequently found on normal feet, but are usually due to a chronic infection. In removing these spurs

it is of cardinal importance that the bursa associated with them should also be taken away.

Geist reports 80 cases of weak foot with short tendo Achillis, strongly insisting upon the relation which this bears to the foot disability. It is sometimes called "muscle-bound" foot. This condition, in many cases, but not in all of them, is due to the wearing of high-heeled shoes, and is corrected by forcibly stretching the tendon, or if this prove ineffective, by achillotenotomy.

This study, which in its findings is in accord with many others, is of especial interest and importance to the general practitioner since it accentuates the fact that the artificial arch support is not a universal cure-all for painful feet and often does more harm than good. Further, it is shown that the vast majority of weak feet may be cured by patient, long-continued exercises so conducted as to strengthen the muscular and tendinous supports, supplemented by properly fitting shoes.

The need of an examination so conducted as to detect an existing arthritis, arteriosclerosis, or anomaly in growth is shown by the number of cases recorded. It can be predicted that the number of those suffering from weak feet in the future will be greatly lessened by the athletic training now so widely given to the rising generation and by methods of prevention applied during infancy or childhood to those who show a tendency to improper weight-bearing.

CARDIAC MASSAGE AS A MEANS OF RESUSCITATION.

Crile reported in *Surgery, Gynecology and Obstetrics* for December, 1922, three cases in which direct manipulation of the heart seemed helpful in causing this organ to resume its function after a complete arrest occurring in the course of a surgical operation. In the first reported case there could have been no doubt about the heart having no motion since the operation required a resection of chest wall and the heart lay immediately beneath the eye, and accessible to the hand of the surgeon. Finding the beat had ceased, he first pricked this organ with a scalpel, and this irritation was followed by a feeble and ineffective response. He thereupon injected into the left ventricular cavity 10 cc of adrenalin and gave the heart a squeeze, whereupon it began to beat firmly and with great vigor. This treatment was repeated with good effect. Later, following the infusion of 600 cc of blood, the heart dilated, fibrillated, and stopped.

Caine in the *American Journal of Surgery* of April 19, 1923, reports a case of return of beats after massage through the diaphragm. The patient lived through the night. There was a second case in which the heart had stopped for two minutes, followed by a resumption of beats incident to diaphragmatic massage. It is noted that after recovery from anesthesia this patient was completely paralyzed, and remained blind and speechless for some years.

Bearing on arrested heart action occurring in the course of anesthesia, it would seem that this condition may be likened to that of an engine stopped on dead center, and that if this stoppage can be overcome before the disastrous results of lack of blood to vital centers are accomplished, death may be averted.

Many methods have been suggested for overcoming this arrest, which is practically always in diastole; compression of the chest, the insertion of a needle through an intercostal region, massage through the diaphragm, and direct manipulation of the heart, access being obtained through the chest wall or the diaphragm. All of these methods have been tried, and successful results have been attributed to each and every one of them. The question of *post* or *propter* naturally arises. Would the heart have resumed its beat in the absence of any treatment except that directed to the respiration? Sudden violent pressure on even a rigid chest wall or forceful manipulation through the intact diaphragm may

stimulate a quiescent heart to activity, the muscle reacting to the stimulus of trauma by contracting, The response should be immediate and convincing; if it is not the heart should be reached directly and manipulated in such wise that enough blood is forced through it to supply the coronary arteries. To one who has seen the heart in action it is obvious that no form of manual pressure can distantly approach the efficiency of the organ when working as a coördinating contracting muscle.

Krogh on the basis of extensive investigation states that the heart of a man at rest pumps about four liters per minute, and if such a man take violent exercise this quantity may be increased to as much as 30 liters per minute. At the most, external pressure upon a flaccid heart can produce but a feeble movement, and cannot in any way supply either the central nervous system or the system at large with an adequate quantity of blood. It can, however, force a certain quantity of blood from the left ventricle into the aorta and on into the coronary vessels.

It would, therefore, seem that in case of cardiac arrest, the respiration being provided for—and in the modern method of anesthesia it is not difficult for the anesthetist to use positive pressure and oxygen to make this provision—the heart should be promptly reached, should be compressed by the fingers, and that adrenalin should be thrown into the left ventricle and by manipulation the blood forced into the coronary arteries. Concerning the direct approach to the heart, that by thoracic resection is somewhat time-consuming and endangers, even in the most careful hands, the opening of the pleural sac. The approach through the diaphragm, however, is simple, safe, and assured. If the surgeon be performing an abdominal operation, or if the operation be elsewhere, through an incision from the ensiform downward, the hand can be introduced to the dome of the diaphragm and a point one inch to the left of the falciform ligament selected. A pair of scissors thrust through the central tendon, opened and withdrawn, two fingers introduced, and the heart can be pressed against the chest wall, a hypodermic needle can be thrust into the left ventricle, and 5 cc of adrenalin 1:1000 can be injected; whereupon gentle pressure of the heart against the posterior chest wall will force the blood in the left ventricle into the aorta and thence into the coronary vessels. It is true that modern surgery, and particularly modern anesthesia, presents few fatalities on the operating table. These few, however, are sufficiently tragic, and a formulated procedure for their avoidance would seem well worth while. It is worthy of note that gentle pressure by the finger pulps placed just below the auriculoventricular groove on the anterior surface of the heart, this organ being forced back into the hollow made by the ribs arching from the vertebral bodies, is more efficient and much safer than more forceful pressure made elsewhere.

Progress in Therapeutics

Medical Therapeutics

Ulcerative Colitis.

In the *Proceedings of the Royal Society of Medicine* for September, 1923, ROLLESTON states that many methods of treatment have been employed.

As the stomach and small intestine are practically always free from ulceration, and as digestion and absorption are fairly well carried on, it is unnecessary to restrict the diet to slops and soft food. As deficiency in the antiscorbutic vitamin C has been shown experimentally to reduce the resistance to infection (Findlay), and as McCarrison's observations suggest that lack of water-soluble vitamin B favors the incidence of inflammation of the alimentary canal, it would appear reasonable to arrange a diet containing a sufficiency of antiscorbutic food and a fair quantity of protein. Soured milk with living cultures of *Bacillus bulgaricus* has naturally been given a trial, but Hurst did not find that it had any beneficial effect.

The large number of drugs employed is in itself a reproach to purely medical treatment. Intestinal antiseptics, such as salol, bismuth salicylate, B-naphthol, small doses of mercury or calomel, benzyl benzoate, gentian-violet, acriflavine, are on the whole disappointing. Pomegranate bark and simaruba have also been tried; and more recently Logan remarks of kaolin that it "was of no benefit whatever, although it is advised strongly by German writers." Finely pounded charcoal has been useful in reducing flatulence and obviating colic. Liquid paraffin by the mouth has been recommended as forming in the colon a coating in which bacteria cannot live, and olive oil has been advocated both orally and by enemas. Lavage of the colon with antiseptics, such as boric acid, acetozone, argyrol, nitrate of silver, albargin (silver nucleinate), allantoin, emulsion of sulphur, has been much employed; but, as the whole of the colon cannot be thus satisfactorily cleaned, appendicostomy or cecostomy has largely superseded rectal injections as an effective means of washing out the colon. Einhorn employs a "jointed intestinal tube" 15 to 20 feet in length introduced by the mouth and carried, under the guidance of *x*-rays, into the cecum, where it is left *in situ* for days as a means for getting a result comparable to that of cecostomy; this procedure is on its trial. The respective merits of appendicostomy and cecostomy have been much discussed. When the appendix is obliterated, or, for other reasons, cannot be found, a valvular cecostomy can be made; but neither this procedure nor appendicostomy gives the colon that rest from the contact of feces which is insured by an open cecostomy or a colostomy.

In 1911 Sir D'Arcy Power took the cautious view that the improvement after appendicostomy was mainly due to the prevention of toxic absorption and keeping the bowel clean, and stated that the ulcerative process continues until the patient becomes naturally or artificially immune (by means of vaccine). Hurst considers that appendicostomy halves the time of illness that would be experienced under medical treatment, and surgical opinion is strongly in its favor. To give operation a fair chance it should be done before the patient is debilitated, and according to Spencer medical treatment should not be persisted in for more than three months. Short-circuiting the ileum into the pelvic colon has the serious drawback that the rectum is often affected. The radical means of providing physiological rest to the colon is a complete transverse ileostomy so as to exclude the colon; Stone recommends this in combination with a separate appendicostomy for irrigation of the colon.

Vaccines have been extensively employed; few reports are enthusiastic, and the difficulty of obtaining the causal organism is considerable, even with the help of serological reactions. An autogenous bacilli coli or coliform vaccine has usually been employed, but should not be given during the acute exacerbations of this chronic infection, as the condition may thus be seriously aggravated. In 1909 Hawkins advocated antidysenteric serum, especially in acute cases, but without giving any statistics as to its value. In 1921 Hurst recorded very striking results from the intravenous injection of multivalent antidysenteric serum in two patients who did not show dysenteric bacilli in their feces. The healing of the ulcers as watched by the sigmoidoscope occurred in one of the cases in five days after the first injection of serum, but as the blood did not agglutinate any stock dysenteric organism, the question arises how far the curative action was due to the horse serum apart from its specific antidysenteric content.

Treatment of Pneumonia.

NIPPERT, in *Minnesota Medicine* for September, 1923, emphasizes the point that the question of food is very important. It should be almost entirely liquid, consisting of egg-nog, cocoa, buttermilk, tea, orangeade, orange juice with albumen, plenty of water, broths, ice cream, jello, soups, and, later, soft food. Some years ago late in the evening his telephone bell rang and, answering it, somebody inquired, "What food shall I give me husband?" He replied, "Soft food," and was asked, "What do you mean by soft food? We have soft dill pickles, herring that melts in your mouth, cheese so soft you couldn't chew it if you wanted to, and a lot of other soft stuff." He knew the woman very well, and she taught him a good lesson, namely, to be more specific when giving orders. Soft food includes milk toast, coddled eggs, vegetable purée, scraped meat (chicken, squab), stewed fruits, well cooked gruels; all should be given in small amounts but frequently.

A successful enema and a drastic dose of calomel, followed by a dose of magnesium citrate to begin with and continuous attention to free elimination to avoid toxemia as much as possible, are all that is needed in an ordinary mild case of pneumonia. If the toxemia is progressive and increasing, order plenty of water, with the addition of the acetate, bicarbonate and citrate of potassium to increase diuresis. An entero- and hypodermoclysis of normal salt solution or the intravenous administration of 250 cc of 10-per-cent glucose will assist elimination in accordance with common sense. He again emphasizes this because he remembers when an intern in a large middle-west hospital they had a man with a tapeworm. They eliminated so lively that they got head and all, or rather all and head (usually the latter comes last), but as a result of this splendid elimination the patient developed a gastroenteritis and was himself eliminated—"the operation was a success but the patient died," in the parlance of our surgical confrères.

Unfortunately, many pneumonias are not of a mild character and run a more severe course. In these cases how can we prevent myocardial failure, besides giving the patient the already mentioned benefit of proper hygienic conditions? His standby is still digitalis. It does not make so much difference what preparation is used, if one uses one of the standard preparations put out by a reliable pharmaceutical laboratory. At times one will have to reënforce or change to other cardiac or respiratory stimulants, such as atropine, alcohol, camphor in oil, nitroglycerin, strychnine, adrenalin, strophanthus, and caffeine, according to indications. We must not forget that venesection in the plethoric, robust individual with high blood-pressure and bounding pulse and tendency to right heart failure will often relieve the dyspnea. Eight to sixteen ounces may be withdrawn at one time.

Alcohol in the form of whisky or brandy, or a wine like Tokay in one-half-ounce doses every three hours, or oftener, is an excellent cardiac stimulant, very much appreciated as a rule by male patients and shunned by very few female patients. It can be administered in different ways, cool or warm, or flavored with orange, lemon, or lime juice. Some who do not believe in prescribing alcohol can relieve their consciences by dispensing or causing to be dispensed to their patients such innocent compounds or mixtures as elixir simplex, which contains only 33 per cent alcohol, or that beautiful reddish-pink elixir lactopepsin 13 per cent (tincture digitalis contains 70 per cent alcohol), elixir I.Q.S. 20 per cent, elixir heroin cum terpin hydrate about 45 per cent, or essence pepsin 15 per cent.

A favorite prescription of Nippert for patients is

> Spiritus ammoniæ aromaticus, ½ drachm;
> Spiritus frumenti, ½ to 1 ounce;
> Syrup of tolu, 1 drachm;
> Aquæ, 2 ounces.

Of course everybody knows that alcoholics need larger doses of alcohol and should not be deprived of it.

Pain, so often the initial symptom and at times very severe, must be relieved by opiates, preferably hypodermics of morphine, codeine, or pantopon hydrochloride in proper dosage and repeated if necessary. The old-time mustard and flaxseed poultice feels at times very agreeable, and keeps the family interested in doing something. An ice-bag applied locally is of value.

Fever will as a rule take care of itself. A temperature of 104°, while appearing ominous to the relatives, he is rather pleased to observe in the beginning of the illness. This, with a high leucocyte count, indicates to him a good reaction. If the temperature persists we must rely on hydrotherapeutic measures, applied with common sense. An ice-bag to the head, an occasional tepid sponge, or an abdominal pack is called for. If one feels like using an antipyretic drug, a large dose of quinine gr. xv to xx, repeated in six to eight hours, is much preferable to the depressing coal-tar products.

Excessive cough, often so exhausting and rest disturbing, can be relieved or ameliorated by sedatives and expectorants.

Edema of the lungs calls for venesection in suitable cases and the use of atropine or oxygen. Sleeplessness, insomnia and extreme restlessness may be relieved by small doses of chloral or adalin or veronal, repeated as required.

The Calorigenic Action of Adrenalin Chloride.

Boothby and Sandiford, in the *American Journal of Physiology* for September, 1923, state that the mechanism of the increased heat production must be considered as possibly in part due to increase of carbohydrate metabolites, on account of the similarity of the metabolic rate curve following the injection of adrenalin to that found by Lusk and others from a carbohydrate plethora. However, they have previously presented evidence that the calorigenic action of adrenalin is too great to be accounted for entirely by the slight increase in blood-sugar concentration produced by the small doses of adrenalin used in their experiments. It seems more probable, therefore, that the increase in the blood sugar either is a compensatory mechanism produced by the action of adrenalin as an aid to the increased heat production, or is the consequential result of the reaction.

They believe that their evidence proves that adrenalin in amounts within the probable capacity of the adrenal glands to secrete, accelerates the rate of heat production in the intact animal body, and therefore permits the tentative generalization that one function of the adrenal glands is to furnish a secretion which accelerates the velocity of an as yet unknown chemical reaction, or reactions, in the direction accompanied by the liberation of heat.

The object of this paper is to present, as briefly as possible, evidence that adrenalin,

when injected intravenously into dogs in doses that seem probably within the power of the adrenal glands to secrete, does actually increase the rate of heat production, probably producing this increase by a general and quite parallel increase in the heat production of all or nearly all types of cells. The increased metabolism is accompanied by an elevation of the respiratory quotient, and by a slight increase in the blood-sugar concentration, as well as certain other secondary manifestations.

The Treatment of Refractory Cases of Amebic Dysentery.

WILLMORE, in the *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 1923, states that the diagnosis, treatment, and prognosis of all cases of *E. histolytica* infection should be controlled by clinical and sigmoidoscopic examination of the patient, and microscopic examination of his stools, repeated at regular intervals. Scrapings should be taken from the yellow submucous points, and examined fresh under the microscope.

Sigmoidoscopy should be performed with the utmost care and gentleness, always without an anesthetic, and the instrument should be guided by the eye.

The information obtained by its use is of the utmost value, as pointed out, first, by Sir James Cantlie, and later by Manson-Bahr. It is always encouraging to watch amebic ulcers healing under the influence of treatment; but it is dangerous to rely entirely on these findings in making a prognosis. A man may, on admission, reveal a mucosa studded with amebic ulcers, and after a course of treatment not an ulcer nor a pin-point of submucous infiltration may be visible. It must be remembered that only some 30 cm. of the bowel can be seen with this instrument; and if an infected cecum be left—the existence of which may be indicated by definite tenderness on palpation or by persistent facial pallor—that man is sure to return with a mucosa in as bad condition as when he left. The infection appears to trickle down the bowel.

If any benefit is to accrue from any given treatment it will be apparent quickly, and nothing is ever to be gained by pushing treatment that does not show early results, clinical if not protozoöscopic.

Emetine in any form is a poisonous drug, and extreme care is always necessary in its administration. Different individuals vary greatly in their susceptibility, the utmost caution being urged in all cases in which the myocardium is affected by such diseases as malignant tertian malaria, severe influenza, pneumonia, diphtheria, etc. Patients must be kept at absolute rest during its administration in concentrated form.

Surgical measures, such as appendicostomy and cecostomy, may be required to save life in exceptional cases, but they are not followed by a greater percentage of ultimate cure.

The patient must be treated as much as the disease.

The present state of our knowledge leaves much to be desired, and further research on this subject is urgently needed.

Quite recently, on the advice of Major Brown and Dr. Henry, who provided him with the necessary formulæ and chemicals, ten of the most refractory cases have been treated with rectal injection of a suspension of hydrated quinine base, freshly activated with potash prior to use. The results so far are most encouraging, provided that the patient be able to retain the enema long enough; the optimum period is not less than two hours.

Drugs and Basal Metabolism.

BOOTHBY and ROWNTREE, in the *Journal of Pharmacology and Experimental Therapeutics* for September, 1923, state that their experiments taken in conjunction with those reported in the literature warrant at the present time the following conclusions as to the action of drugs on the basal metabolic rate:

The common drugs (not including preparations representing internal secretion) if

administered in single, moderate doses do not demonstrably influence the basal metabolic rate. Caffeine alkaloid in large doses seems to cause an elevation in the heat production (Means, Aub and DuBois), but did not do so in the smaller doses used by them. Iodine, or the iodide, if administered in a sufficient quantity for several days to patients with an adenomatous enlargment of the thyroid gland is apt to cause an elevation of the basal metabolic rate by converting the condition of adenomatous goitre without hyperthyroidism into the disease designated by Plummer as adenomatous goitre with hyperthyroidism (Snell, Ford and Rowntree). Iodine, in the form of Lugol's solution, nearly always causes a marked drop in the basal metabolic rate with coincident clinical improvement in patients with exophthalmic goitre (Plummer). Morphine in sufficient quantity to produce sleep lowers the heat production (Lusk).

Of the preparations representing the secretions or the active principles of the ductless glands, adrenalin has a definite and intensive calorigenic action with its maximum effect a few minutes after administration (Boothby and Sandiford). Insulin does not apparently possess a direct calorigenic action, although it causes an increase in the basal metabolic rate in the fasting individual if the blood sugar falls to a critical level associated with symptoms of hypoglycemia; this reaction, however, appears secondary to the mechanism which helps to stop the further progress of the fall in the blood sugar level (Boothby and Wilder). Thyroxin possesses a definite and quantitative calorigenic action which does not appear for several hours after administration, and reaches its maximum effect after several days; in the thyroidless person this effect may not disappear for several weeks (Boothby and Plummer). No other ductless gland preparation, excepting those just mentioned, has yet been demonstrated to have either an immediate or a delayed influence on the basal metabolic rate.

In the clinical estimation of the basal metabolic rate neither adrenalin nor insulin should be given within several hours preceding the test. Although thyroxin does not cause an immediate rise in the metabolic rate, no test made subsequent to its administration, at least for a period of several weeks, in a patient suspected of a metabolism below normal, can be assumed to represent the lowest metabolism of that individual. The administration of iodides does not affect the metabolism of a normal individual, but may convert a case of adenomatous goitre without hyperthyroidism into one with hyperthyroidism, and the increased metabolism, when so produced, represents the intensity of the new syndrome. Aside from exceptions indicated here, it is unlikely that any of the ordinary drugs in doses used in clinical work will invalidate basal metabolic rate determinations.

Anesthesia for Children.

The *Lancet* of September 15, 1923, calls attention to a paper on this subject by Sington before the British Medical Association, in which the author divided his subject into four parts: (*a*) the consideration of the preparation of the patient; (*b*) the choice of the anesthetic to be used; (*c*) a few points on the administration of the anesthetic of choice; and (*d*) some suggestions for making the recovery as free from discomfort as possible. Under the first head he stressed the importance of refraining from drastic purgation, and the necessity for examining the patient's urine for acetone, which was often the result of sudden change from a very rich carbohydrate to a more mixed hospital diet. Operation must be postponed until the acetone has disappeared. In all cases glucose should be given before operation, as well as a preliminary injection of atropine. In a child of two years and upwards as much as 1/100 gr. could be safely given. On the other hand, morphine should be avoided in the case of children.

As regards the second heading, ether was the anesthetic of choice, except when the actual cautery was to be used, and in certain special operations such as dental extractions, where ethyl chloride was preferable. Gas and oxygen was the best anesthetic in cases of congenital hypertrophic stenosis of the pylorus and of intussusception. Under the heading of the administration of the anesthetic he insisted that the anesthetic of choice should be administered gently and persuasively. A few drops of essence of orange were sprinkled on gauze, and when the child had got used to the smell, ether was slowly dropped on until unconsciousness supervened, after which ether could be pushed. The airway should be kept as clear as possible. Recovery could be made much less unpleasant if (1) a drop of ol. ricini were instilled into each eye after the cessation of anesthesia, (2) the mouth were sponged out with normal saline solution, (3) a rectal sedative were administered, such as, in the case of a child of ten years, potassium bromide 20 grs., aspirin 10 grs., dissolved in half a pint of normal saline solution. [We fail to see how the salicylate can be dissolved.—ED.]

Flemming read a paper on Fatalities from Anesthetics in which he elected to deal with his subject entirely from the clinical standpoint. For some years past the number of fatalities due to anesthetics has remained practically stationary, despite an enormous increase in the number and severity of the operations performed. Patients were now expected to bear a surgical burden so heavy that without improved anesthesia the mortality would undoubtedly have been much heavier than is the case. Deaths from anesthetics might be classified according to what time they occurred during the administration—before, during, or after operation. In the first group were fatalities caused by the anesthetic without the intervention of other factors, such as shock, and a large proportion of these were associated with chloroform induction. Chloroform was too dangerous a drug for routine work. The second group was difficult to analyze, but coöperation between the surgeon and the anesthetist was necessary to avoid overtaxing the patient. When a moribund patient died during operation it was misleading to attribute the death to the anesthetic. In the third group it was almost impossible to fix the blame. Even post-anesthetic pneumonia might be the result of tight bandaging and not of the anesthetic. The surgeon might then call for a change of technique, which, while reducing one risk, might induce another. Again, chloroform might be the safer anesthetic to give to a bronchitic patient, even though there were greater risk during administration.

The Treatment of Dysmenorrhea.

PHILLIPS, in the *Proceedings of the Royal Society of Medicine* for September, 1923, states that fifty cases were treated with extracts of ductless glands either alone or in combination with antispasmodics; forty cases were treated with antispasmodics alone, and ten cases were treated with sedatives.

Only ten of the hundred failed to be relieved and eventually came to operation.

Fifty cases were treated by organotherapy. Extracts of thyroid, corpus luteum, anterior lobe of pituitary, and mixed gland products were used separately and effectively. The majority were treated with hormotone as follows:

1. Mist. cascara co. daily throughout the month.

2. Hormotone, 1 tablet t.d.s. for seven days before and during the period.

3. If unrelieved the following every three hours till relief was obtained (up to four doses):

Antipyrin, 5 grains;
Ext. caulophyllin liq., 15 minims;
Caffeine, 5 grains;
Aq. chloroformi, ad 1 ounce.

Or,

Antipyrin,
Aspirin,
Pyramidon,
Caffeine, 4 grains of each.

Repeated three-hourly up to four doses in cases where pain was severe.

Sometimes tincture of belladonna 5 minims was added to the above mixture, and sometimes other antispasmodics such as benzyl benzoate were substituted. Sometimes atropine sulphate 1/100 gr. as a tablet was used.

Forty-six of the fifty cases so treated were relieved. In some cases pain was not abolished, but diminished, and in all the forty-six cases the patients were enabled to work throughout the period in comparative comfort. Often when the tablets were omitted the painful periods returned, only to disappear at the next period when the hormotone was readministered.

The amount of relief obtained varied with the individual, but it was always definite and in the majority of cases sustained. Of the forty cases treated with antispasmodics alone, thirty-four were benefited, and only six came to operation. Ten cases were treated between the periods with bromides and salicylates combined with laxatives; and during the periods small nightly doses of luminal were given. All were relieved.

Alkali Deficit in Nephritis.

MARRACK, in the *Lancet* of September 22, 1923, states that unlike other disturbances in severe nephritis alkali deficit is amenable to treatment, and treatment of the more severe degrees is certainly advisable, as the body will not stand more than a certain increase in the hydrogen-ion concentration of the body fluids, and as the bicarbonate falls the change in hydrogen-ion concentration produced by a given increase of retained acid steadily rises. On the other hand, the urgency of the need of alkali is not so great as to demand such emergency methods as intravenous injection, as there is not the rapid production of acid such as may take place in ketosis, and enough alkali can be given by the mouth to neutralize any fresh acid that may be formed and leave an excess for increasing the plasma bicarbonate. Rectal administration should not be employed, as it is impossible to form an accurate estimate of the amount absorbed.

The oral administration of sodium bicarbonate by the mouth has its dangers. Nephritics are unable to get rid of an excess of alkali as well as an excess of acid, and if excess is given a condition of alkali excess is produced, a condition more dangerous than alkali deficit, although it tends to cure itself if alkali administration is stopped. For this reason the amount of bicarbonate given should not be more than required to bring the plasma bicarbonate back to normal. Also the administration of large doses of sodium bicarbonate alone is liable to upset the balance between sodium, potassium, and calcium in the body fluids; for this reason potassium and calcium should be given at the same time. Calcium administration is all the more necessary as plasma calcium is often low in nephritis with alkali deficit. Again, administration of large doses of sodium bicarbonate often leads to increased retention of water, and increases edema and the danger of edema of the lungs; this provides further reason for keeping the amount given as low as possible. It is, therefore, desirable to give about as much sodium bicarbonate as will bring the patient's plasma bicarbonate up to 40; this removes the danger of the development of a fatal hydrogen-ion concentration. The amount required to do this can be calculated from the formula g=W (40—x) 2, where x is in the patient's plasma bicarbonate before administration, W his weight in kg., and g the number of grains of sodium bicarbonate required. With this should be given g/20 gr. potassium bicarbonate, and calcium lactate. Having brought the plasma bicarbonate up to this level, the production of acid should be kept as low as possible by feeding the patient on a mainly carbohydrate diet to reduce the production of acids from food protein or from the patient's own tissues to a minimum, and moderate doses of sodium bicarbonate—*e.g.*, 20 grs. three times a day—

should be given. Such treatment will not prevent the patient from dying from other causes; it may not prolong life, but it removes the risk of death from uncompensated alkali deficit.

The Treatment of Anesthetic Sickness.

BLOMFIELD, in the *Lancet* of September 1, 1923, under "Modern Technique in Treatment," states that the preventive treatment consists in (1) the proper preparation of the patient, and (2) the selection of the most appropriate anesthetic and method of administration for the particular patient. The preparation of the patient can be so overdone as to bring about more harm than good. With the ordinary healthy adult the less that his usual habits are interfered with the better. The operation should be arranged for a time about corresponding with that of a meal in the ordinary course of affairs, so that the stomach will be reasonably empty. An aperient should be given thirty-six hours before the operation time. The old practice of giving an enema an hour or two before operation is to be discouraged. The less the patient is interfered with shortly before the anesthetic is given the better. If he is nervous or a poor sleeper a bromide draught should be given the last thing on the night preceding the operation. Bromidia is a useful preparation for this purpose. During the twenty-four hours before operation the patient should be encouraged to drink water or some mildly alkaline mineral water between meals. Vichy water can be freely and comfortably taken by most people who consume three pints with benefit in the twenty-four hours. During the same period barley-sugar should be sucked often in order to supply the desirable amount of extra glucose. Meals should be of the kind to which he is accustomed, but the proportion of carbohydrate constituents—bread, sweets, and fruit—should be increased at the expense of the protein (meat) factors.

One feature in the preliminary preparation deserves more attention than it usually receives. This is the search for and removal of any form of local sepsis. Thus the mouth should be carefully cleansed after every meal, the teeth and gums examined and dealt with by a dentist if necessary. The nose and antra should be inspected and should receive any treatment found needful. The septic patient is likely to suffer from after-sickness. Besides treating the local source of infection the practitioner will improve his patient's prospects of a comfortable recovery after anesthesia if he supplies some general treatment too. Nixon Groves, who has given much attention to this subject, uses the hypodermic injections of isotonic iron and strychnine (Fraisse) consisting of: cacodylate of iron, 0.01 g.; glycerophosphate of soda, 0.1 g.; cacodylate of strychnine, 0.005 g. He also has seen much benefit from the preparation of aluminum hydroxide known as alocol. When an operation is not one of urgency a week or two spent beforehand in eliminating all chance of sepsis and in perfecting the blood-state of the patient is time well spent in a way that will repay both patient and practitioner after operation.

If the operation is planned for the morning, about 9 o'clock, the patient is allowed a cup of tea as late as 7 o'clock if he is awake and desires it. At 8 he has a hypodermic injection of atropine gr. 1/100. Whether this is combined with morphine gr. 1/6, with omnopon gr. 1/3, or with scopolamine gr. 1/100 must depend on the circumstances of the individual case and no routine rule can be followed. In the case of nervous women it is a good thing to add the scopolamine. Patients who are likely to require large amounts of anesthetic should have omnopon, or both this and scopolamine in addition to the atropine. As regards morphine it is wise not to give it before operation unless the patient knows from experience that it suits him. Some instances of sickness after operation are undoubtedly due to morphine. Atropine, on the other hand, may be used as a routine, and is an important element in diminishing sickness after ether. The use of this drug and the abandonment of closed apparatus during long operations have greatly reduced

sickness after ether administration. Another valuable measure from this point of view is to insure mouth-breathing throughout the anesthesia. Patients who breathe through the nose under the anesthetic, and particularly those with partially obstructed nasal airways who yet strive throughout to breathe through the nose, are much more liable to after-sickness than those in whom the mouth is kept adequately open throughout anesthesia. These patients, with deficient nasal air-passages and high narrow pharyngeal vaults, are in any case the most likely to suffer from protracted nausea after ether.

As regards the choice of anesthetic one is sometimes helped by a previous history to avoid the drug which has made the particular patient sick on a previous occasion. Generally speaking, when nitrous oxide and oxygen alone are sufficient for the surgical procedure they are by far the most likely to give freedom from after-sickness. They provide, of course, no such immunity when ether or C. E. mixture have to be added in the course of operation. Short operations under ethyl chloride are rarely followed by sickness or nausea of any length of time, though they often are by headache. So far as the anesthetist's part is concerned in preventing sickness by his actions during anesthesia the golden rules are: (1) maintain free mouth-breathing; (2) avoid cyanosis; (3) prevent swallowing of mucus or blood in operations where these enter the mouth; (4) keep the amount of anesthetic given within the lowest limit compatible with perfect anesthesia; (5) do not let the patient regain consciousness before he is back in bed, and see that he is moved gently. When in bed, if the operation permits, the patient should lie partly on his right side with the head on one pillow till consciousness has fully returned. After this the Fowler position can often be adopted with advantage.

The after-treatment consists first in maintaining a quiet and darkened room. The patient lies with a towel moistened with eau de cologne or with vinegar laid over his face. Before consciousness has returned a rectal injection is given of half a pint of water containing 1 drachm of potassium bromide and a half-ounce of glucose, with 20 grains of aspirin. By this means the drowsy period is prolonged, during which the elimination of the anesthetic is completed and the likelihood of sickness is diminished. During the next twelve hours fresh fruit juice is the most suitable sustenance. Sucking pieces of fresh pineapple relieves thirst, combats any unpleasant taste in the mouth, and supplies glucose. It is also for many people the most welcome and least nauseating form of nourishment during the early hours of recovery. Failing this, portions of orange may be sucked. If after consciousness has returned there is definite retching or vomiting, a glass of water containing one drachm each of sodium bicarbonate and sal volatile is to be drunk outright. This must be repeated if necessary. In addition to this after abdominal operations, if there is distention as well as nausea, hypodermic injections of pituitrin in boiled water may be employed. An alternative measure which some have found successful is repeated administration of small doses of calomel.

The practice of refusing absolutely to allow anything to be put into the stomach during the first twenty-four hours after anesthesia does not meet with success enough to justify the extraordinary discomfort it inflicts on the patient. In some cases sickness is brought to an end by permitting some solid food in the form of cheese-biscuit or the like. In others there is presumably a nervous element in the causation, and the application of a mustard-leaf to the epigastrium is often successful, and so is placing the patient prone on his belly. If after twenty-four hours vomiting still goes on the stomach should be washed out with weak solution of bicarbonate of soda, and for twelve hours nothing should be given by the mouth, the patient subsisting on glucose and saline per rectum. It must be mentioned that crême de menthe has at times been found most successful in putting an end to post-anesthetic nausea, and that a like success is often claimed for frequent small doses of iced champagne.

The Treatment of Bacterial Infection of the Urinary Tract in Infancy and Childhood.

In the *Lancet* of September 22, 1923, SMITH states that this resolves itself into rest in bed and liquid diet with plenty of bland fluids.

Attention to the bowels, correction of constipation, the arrest of any diarrhea or morbid processes in the bowel, and the administration in any case of some regular intestinal antiseptic.

The exhibition of drugs, of which by far the most valuable are simple alkalies, such as potassium citrate, sodium citrate, or sodium bicarbonate. These must be administered in large doses; 10 to 15 gr. of the former can be safely given every two hours to an infant of one year for a short period, and then given four-hourly and six-hourly until all pus and B. coli have disappeared, or mixtures of potassium citrate and sodium bicarbonate may be used. Continuation of this treatment is generally recommended until all constitutional symptoms have subsided and the urine is alkaline.

Smith states that subsidence of constitutional symptoms does not imply freedom from B. coli infection, and that alkalinity of the urine cannot always be attained, even with very large doses of alkalies by mouth—and that, moreover, despite alkalinity of the urine, attacks of fever and recrudescences of the disease may still occur. The only real indication of cure is the absence of pus and microörganisms from the urine. Occasionally large doses of alkalies are ill borne, and continued administration unquestionably in many cases produces lack of appetite, general depression, and even vomiting. They should, however, be pressed to the limit of tolerance, and may then be superseded by some urinary antiseptic, such as helmitol or urotropin. He has never seen any real benefit accrue from the use of these substances alone in this disease, except in the case of mixed infections. However, the alternative use of these drugs and alkalies seems at present the best procedure when the disease is protracted in its course.

As to treatment by autogenous vaccines he has personally had very little success. In a few cases Smith has even believed he has seen harm done, and in the chronic recurrent case, where one most desires assistance, it has in his hands proved useless.

The question of mechanical interference, such as lavage of the bladder, is one to be carefully considered. In mixed infections this is possibly of value, but in the great bulk of cases and in all pure B. coli infections, instrumental treatment should be avoided. Whatever method of treatment is employed, every effort should be made to see that the urine is free from B. coli before such treatment and observation is discontinued. Many chronic cases, the author is confident, arise from neglect of this simple precaution.

The Treatment of Chronic Arthritis.

WYNN, in the columns on "Modern Technique in Treatment" in the *Lancet* of September 22, 1923, states that no drug has a specific action on arthritis; guaiacol carbonate, guaiacum and sulphur, iodides, arsenic, collosol sulphur, and collosol iodine have their advocates. Drug treatment is mainly symptomatic. With rheumatoid arthritis, acid hydrochloric dilute, minims 20, well diluted, taken after food helps to correct the hypochlorhydria and intestinal infection. Liquid paraffin, collosol kaolin, and dimol may be used for intestinal stasis together with a proper fitting abdominal support. Thyroid is of great value in advanced rheumatoid cases with hypothyroidism and the osteoarthritis occurring at the climacteric. In acute fibrositis saline diuretics should be used. Hematinics can be prescribed for anemia. Acetylsalicylic acid is useful, but is apt to be abused. For catarrhal conditions of throat and nose an atomizer with collosol argentum may be used several times a day

and the tonsils swabbed with 10-per-cent argyrol.

The future of these cases is not so hopeless as was once thought. In most cases improvement can be brought about, and sometimes the results of treatment are brilliant. No disease requires more patience and perseverance, and the suggestive therapeutics of hope and confidence are more valuable than drugs.

Operations of the Cardiac Nerves in Angina Pectoris.

In an editorial on this subject the *Lancet* of September 1, 1923, states that apart from the nerve ganglia which lie in the heart itself, there are two sets of nerves supplying the heart, namely, the sympathetic from the cervical ganglia and branches from the vagus. Recently attempts have been made to influence the pain in angina pectoris by operations on both these sets. Brünig, of Berlin, reports the work hitherto undertaken in this direction. Experimental physiology teaches us that the accelerator fibers to the heart pass in the sympathetic, whereas the depressor fibers run in the vagus, but, as Brünig points out, these facts have been deduced from observations on animals, and recent advances in our knowledge have shown that there are often great differences between the vegetative functions in man and in animals, and therefore any such analogies must be accepted with caution. The fact that many heart conditions, especially angina pectoris, cause such great pain leads one to the conclusion that the nerves to the heart contain not only efferent but also afferent fibers, which bring the pain into consciousness.

In 1899 Frank had the idea of resecting the cervical sympathetic and its ganglia to combat the pain in angina pectoris, and in 1916 Jonescu carried out the operation in one case. In 1922 he and Tuffier both reported a further successful case. In January, 1923, Brünig extirpated the left cervical sympathetic with good results, while in the beginning of this year Pleth and Coffey reported four or five similar operations, with one death. The operation consists in resecting the whole of the cervical sympathetic nerve with its ganglia, including the stellate ganglion, in this respect differing from the earlier operations for Graves's disease, epilepsy, and glaucoma, which left the last-named ganglion intact. In Brünig's case he succeeded not only in permanently relieving the pain, but also in checking the attacks of rise in blood-pressure (at times over 100 mm. Hg) usually associated with the disease. This is significant, as repeated attacks of constriction of the blood-vessels (the cause of the rise in blood-pressure) must in the end lead to changes in the walls of the vessels, and predispose to cerebral hemorrhage. The results of the operation are, as shown by Jonescu's case (observed over eight years), permanent. Among the 12 cases reported there has only been one death, that of a man suffering from aortic syphilis and commencing aneurism of the aorta. Brünig has now successfully operated on a further eight cases, some for other conditions.

That the results of the operation are satisfactory is not surprising, for we know that stimulation of the sympathetic causes contraction of unstriped muscle, as well in the intestinal canal as in the blood-vessels. We know also that stimulation of the vagus has an antagonizing action, but it is extremely surprising when we hear from Eppinger and Hofer that they have achieved the same result in the same condition by division of the vagal cardiac branches. The reasoning that led them to try the operation was the conception that the pain in angina pectoris was caused by a vasomotor contraction of the coronary arteries, which produced a dragging or irritation of the nerves surrounding the aorta, and that this stimulus was carried to the central nervous system by the cardiac branches of the vagus. Therefore, if these

nerves were divided the pain would be relieved. Up to April of this year the operation has been carried out in six cases, three times unilateral and three times bilateral. All the cases were suffering from an aortalgia, as far as one can tell from the short accounts so far published, and there was no case of true vasomotor angina pectoris among them. In five cases the attacks of pain were cured, while one died from paralysis of the vocal cords following injury to the recurrent laryngeal nerve.

How is the fact to be explained that the interruption of two nerves hitherto believed to be antagonistic has the same effect in relieving the pain in angina pectoris? The suggestion that during the sympathetic operation the vagal cardiac branches are also injured is to Dr. Brünig, with his technique, inconceivable; but he thinks it is possible that the vagal branches are in reality sympathetic fibers arising in the superior cervical ganglion, passing through the dense plexus between the latter and the ganglion nodosum of the vagus, and out through the cardiac branches to the heart. Division, therefore, of the latter twigs would have the same result as extirpation of the sympathetic ganglion from which they arise.

So far it has only been proved that division of the vagal branches is useful in cases of aortalgia; no cases of true angina pectoris have been so treated; nor do we know whether the attacks of rise of blood-pressure would be influenced. On the contrary, if the so-called depressor nerve has identically the same function in man as it is known to have in animals—namely, to cause on stimulation a fall of blood-pressure—it might be very risky to divide it on both sides, thereby cutting off a valuable safety-valve for the heart. The indication, therefore, for the vagus operation is very limited as compared with the sympathetic, for, first, it is only applicable to aortalgia, and, secondly, in cases of angina pectoris it may not be entirely without risk. But if it can be proved after extensive use that it still has good results, then it may be preferable, as being more conservative, and necessitating only division of a nerve as compared with resection of the whole cervical sympathetic chain.

The technique of the vagus operation could, however, be simplified. Hofer traces the vagus nerve close up to the jugular foramen, and then traces its branches down to the thorax, and only those which pass freely into the thorax are divided, but great difficulty must be experienced in avoiding the superior and inferior laryngeal nerves. Brünig, therefore, suggests that the carotid sheath should be opened for a distance of about 5 cm. in its lower portion, and that the whole sheath should be removed for a similar distance, leaving the vessels and vagus nerve bare in this region. By this means all the nerves running in the sheath must be divided, including the depressor. But he maintains that the sympathetic operation is the better, both physiologically and because it has a larger field of application. The future will, however, show which is preferable. One thing is certain, that operations on the cardiac nerves will increase our knowledge of their physiology, and therapy will thereby benefit.

The Value of Splenectomy in the Primary Anemias.

KRUMBHAAR, in the *American Journal of the Medical Sciences* for September, 1923, states that in considering the effects of splenectomy in individual diseases the results are not materially changed since he last collected reports on this question. Nevertheless, by a swing of the pendulum, which is so common in medical advances, splenectomy for pernicious anemia, the most important disease of the group, is now, in his opinion, being neglected just as much as it was being overdone six years ago. The conclusions that were reached at that time have, it seems to him, largely been confirmed by subsequent studies. The

operative mortality has been lowered, and most of the survivors have shown marked temporary improvement, the remission usually lasting longer than the average length of natural or post-transfusional remissions. In fact, there is a respectable number of cases that have continued in good health for two to six years after splenectomy. Therefore, his former question, "May it not develop that a larger percentage of such cures (3 in 1200 by the older methods, according to Cabot) will follow splenectomy even though the blood picture does not return absolutely to normal?" can, he thinks, properly be answered in the affirmative.

Of the 208 cases in his list, Griffin reports that 11 of his 53 lived more than three years after operation and 5 still live between four and five years after operation. Of Walterhofer's 16 cases, 1 survived for five years, and 2 more for from two to four years, and so on. This does not mean that every case of pernicious anemia should have the spleen removed or that a cure should ever be hoped for; but it does, to his mind, indicate that in certain cases, especially those that have a relatively recent onset, with a fair blood picture and signs of an enlarged spleen and increased hemolysis, splenectomy is usually advisable. How it should be combined with transfusions is a question that he cannot discuss at this time.

In hemolytic jaundice the results of splenectomy continue to be excellent. Although in many cases the resistance of the erythrocytes does not return to normal (indicating that the primary cause of the disease is not in the spleen but probably in the erythrocytes themselves), nevertheless the anemia and jaundice disappear, the urobilin excretion and reticulocyte percentage diminish, and the patient is for practical purposes well. If Mayo's caution not to operate during a "crisis of deglobulization" is heeded, the operative mortality may be reduced even below the present rate of 3 per cent.

The improvement that has long been known to follow splenectomy in Banti's disease is supported by the later figures. Abdominal adhesions and hemorrhage from varicose veins add to the difficulties of the operation, but marked improvement can be promised to most of the survivors. In fact, many have continued so long without symptoms that they have been reported as cured, but it is unwise to use the term "cure," when the operative procedure has merely removed the chief disturber of the hemolytopoietic balance rather than the cause of the disease itself. He recognizes, of course, that as negative methods are the only ones at present available for diagnosing Banti's disease, many cases of splenomegaly due to lues, cirrhosis, portal phlebitis and similar causes are undoubtedly included, and it is especially hard to distinguish them when successful removal of the spleen in the latter group also results in improvement. Nevertheless, the conviction persists that Banti described a primary disease the cause of which is unknown, but which is greatly improved by removal of the spleen.

The most important additions that have been made to our knowledge of this subject in recent years have come from the Mayo Clinic. Thanks to them not only have most of our previous opinions been confirmed, but reliable estimates made about the value of splenectomy in newer fields. Thus while in leukemia operation was formerly considered as definitely contraindicated on account of the high operative mortality, the Mayos have had only one postoperative death in 26 cases (much less than in splenic anemia); on the other hand, 15 have subsequently died, so that Giffin considers splenectomy helpful only in a few of the very chronic types of myelogenous leukemia where the organ is fibrous and the leucocyte count never very high. Splenectomy in cases of splenomegaly associated with chronic sepsis has also proved unsatisfactory, both on account of the high operative mortality (20 per cent) and the poor end-result (3 out of 10 survive, and one of these is in poor condition).

In luetic and malarial splenomegaly not only are the patients' conditions directly improved by removal of the spleen, but they are also usually rendered much more

amenable to specific treatment, to which they may previously have proved intractable. In fact, if he may venture an opinion on what is more directly a surgical problem in such secondary splenomegalies, the question being mainly one of operative risk, it would seem desirable to limit the operation to chronic cases that have proved resistant to all other forms of treatment and to proceed with extra conservatism where many adhesions multiply the chances of shock and hemorrhage.

Surgical and Genito-Urinary Therapeutics

Tularemia.

The Bacterium tularense, discovered by McCoy and Chapin as the reason for a fatal epidemic of brown squirrels in California, when it attacks man causes fever, prostration, and enlargement of lymphatic nodes containing the focus of infection.

FRANCIS *(The Military Surgeon*, August, 1923) publishes the report of a man in a Washington market who was selling rabbits, the liver of which exhibited many necrotic foci indicative of tularemia. From these foci pure cultures of the organism were afterwards obtained. The market man gave a history of having suffered the year before from what he called "rabbit fever," and an examination of his blood serum showed that it agglutinated the Bacterium tularense in dilutions of . 1:100, thus explaining his immunity at the time of the report.

Francis states that examination of rabbits for evidence of tularemia should be undertaken in the months of November, December, and January. He states that the infection has been found on the Pacific coast. So far as known it is confined to the United States, Francis holding that the distribution of tularemia east of the Mississippi can be studied in the markets. He states that errors in diagnosis arise in cases which simulate typhoid fever, septic infection, and glanders.

In an endemic focus in Utah and the adjoining States, a person presenting a flybite in June, July, or August, with inflammation of the adjacent lymphatic glands, and with fever and prostration, arouses at once the suspicion of tularemia.

In the case of a person who has dressed and prepared rabbits for the table, as in the case of a market man or house servant, and who develops inflamed glands of the cervical, epitrochlear, or axillary regions, accompanied by fever and marked illness, tularemia should be borne in mind and the appropriate tests should be made. These cases usually develop in the months of November, December, and January, when rabbits become a common article of food offered in the markets.

Laboratory workers engaged in dissecting guinea-pigs, rabbits, and mice artificially infected with Bacterium tularense, and who present a sudden onset of fever, with or without glandular enlargements, and with or without an evident site of infection, should immediately consider tularemia.

In laboratory tests in animal inoculation pus obtained from the site of the fly-bite, from some other site of infection, from the patient's suppurating glands, or from a wild rabbit's spotted spleen or liver, should be injected subcutaneously on the abdomen of guinea-pigs or rabbits. Such material should be rubbed in a mortar, suspended in saline solution, and strained through coarse gauze. Within a week the animals should die, presenting a gray, granular caseation of the enlarged lymph glands of the groin, and great numbers of small foci of necrosis studded over the enlarged spleen especially and over the liver.

Material from the dead animal's glands, spleen, and liver, when rubbed on the shaved, abraded skin of another guinea-pig or rabbit should likewise cause its death within a week, with the same typical lesions of the lymph glands, spleen, and liver. Thus the infection may be propagated for an indefinite number of passages through guinea-pigs or rabbits.

The Death of the Full-time Extra-uterine Fetus in Situ.

OLIVER *(New York Medical Journal and Medical Record,* July 18, 1923) in discussing this subject observes that each of the Fallopian tubes, which is of about the size of a goose-quill and measures nearly four inches in length, is enveloped closely in peritoneum except over about one-sixth of its most dependent surface, where it rests on the areolar tissue in the broad ligament and where the latter constitutes a sort of meso-salpinx. The mucous lining of the Fallopian tube is somewhat plicated longitudinally and is continuous with that of the uterus, but it differs from the latter in that it possesses no glands. Directly underneath the peritoneal covering of the tube there is a small amount of areolar tissue, and between the peritoneal covering and the mucous membrane are two delicate layers of muscular fibers—an external or longitudinal and an internal or circular. The blood supply to the Fallopian tube, which is sufficient to meet its ordinary every-day requirements, is derived chiefly through a few small offshoots from the ovarian artery, a vessel which, running tortuously in the broad ligament from the side of the pelvis, devotes its supply of blood chiefly to the ovary.

The capillary vessels in the fibrovascular layer of the mucous lining of the tube are apparently constituted like the capillaries of any ordinary mucous corium. Because the blood supply to the Fallopian tube and the substance of the broad ligament is very ordinary, every fetus which attains maturity outside the uterus is enabled to do so in virtue of an accessory supply of blood, obtained by the structure in which the fetus has been lodged contracting adhesions with the omentum, and sometimes with the bowel as well. These adhesions are not associated with any inflammatory reaction but result merely in consequence of the greatly increased vascular activity in the structure harboring the product of conception, and the demand of the fetus for an adequate supply of all those materials necessary for its development and growth. The blood supply to the uterus is on a very different footing and is capable of furnishing all the nutriment necessary to meet the requirements of two, three, or even four fetuses.

When a fertilized ovum becomes arrested in the Fallopian tube, it endeavors forthwith to anchor itself by chemiotaxis on that surface of the tube which rests in the substance of the broad ligament, as here alone is it likely to be able to arouse that amount of vascular reaction which is necessary for its immediate requirements. The area of this vascular reaction is not limited but involves more or less markedly the blood-vessels of the entire tube, and if sufficient nutriment is not obtainable from the immediate implantation area, then the oösperm in a definite attempt to safeguard its existence becomes villous over its entire surface. The chorion possesses everywhere the power of throwing out villi, but the product of conception that becomes universally villous is pathological and has become covered all over with villi because it failed in a normal manner to secure for itself that amount of pabulum that it required. So ill fitted, however, are the capillaries of the Fallopian tube to undergo the progressively increasing amount of dilatation that the actively developing product of conception demands, that the process of gestation seldom proceeds far before some of the attenuated capillaries rupture and the hemorrhage that results not only causes the embryo to perish, but may endanger the life of the mother. It must be remembered that, on account of a more or less prolonged continuance of the patency of the breach in the wall of such enormously dilated capillaries, recurring hemorrhages are likely to take place, and

sooner or later the blood thus thrown out escapes into the peritoneal cavity by bursting the greatly thinned Fallopian tube. On this account an ectopic gestation seldom proceeds far before it is brought to an abrupt termination, and consequently it rarely happens that an extrauterine fetus is so safeguarded as to reach maturity. Out of sixty-three cases of ectopic pregnancy that the author has himself dealt with by abdominal section, in six only had the fetus attained maturity, and in all of these the infants had died before the mothers came under his observation; in each case the mothers sought advice simply and solely because childbirth had not yet taken place as had been expected.

During embryonic growth, and especially in the early days of embryonic growth, water plays a most important rôle, and it must be evident that the osmotic powers and processes of the cells of the embryo must be very different and very differently regulated from those of the cells of the mother. So, too, the need of the embryo for mineral substances is relatively on a different scale from that of the mother. This applies markedly even in the case of iron. There is, too, on the part of embryonic cells, both vegetable and animal, a remarkable and great demand for fat, and as we find in human milk, which is nature's food for the new-born infant, saturated fatty acids containing six, eight, ten, twelve, and fourteen carbon atoms, fatty acids different altogether from those stored up in the tissues of the mother and drawn eventually into her blood, we are justified in assuming that these same members of the fatty acid series are synthesized in the placenta in the same manner as the mammary glands synthesize them.

It is more than probable, too, that as large quantities of non-nitrogenous food materials are required during the early stages of embryonic growth, the chief carbohydrate used by the embryo is a form of sugar, like lactose, and as this form of sugar does not exist in the maternal blood it will have to be manufactured by the placental cells. Be this, however, as it may, the placenta evolved in association with an extrauterine fetus which attains maturity is in every respect as functionally active and vigorous as any placenta developed normally in the uterus. Structurally the only difference between the two placentæ is that, while the uterine is so related to the uterus as to be shed at the time of parturition, the extrauterine placenta becomes so intimately incorporated with the maternal tissues that it virtually becomes a portion of the mother's body. It is, as a matter of fact, in virtue of this firm union that any extrauterine fetus is enabled to attain maturity, and it is on this account, too, that when operating for the removal of a full-time extrauterine fetus, even though it is known that the fetus must have been dead for weeks, no attempt should be made to remove the placenta, as the mother is almost certain to die in consequence of the uncontrollable hemorrhage which will result. We must recognize and realize that the placenta which has sufficed to bring to maturity an extrauterine fetus is to be viewed for the time being as a portion of the mother's body and must be left undisturbed to undergo gradual absorption *in situ,* which it does because it has ceased to function.

Whether the product of conception is lodged in the uterus or in the Fallopian tube the maternal tissues take no part in the actual production of the placenta itself, which is entirely an embryonic formation. However, as the placenta formed in the uterus has to be shed, the uterine mucosa makes provision for this and keeps on secreting a decidual material which prevents a connective tissue union between the placenta and the uterus. It is truly a somewhat remarkable and inexplicable fact nevertheless, that in a fair percentage of the cases of ectopic pregnancy decidual membrane forms very early in the cavity of the uterus, and this decidual membrane, which may be shed as a complete cast of the uterus and with practically no hemorrhage, contains fusiform and epithelial cells but is constituted chiefly of small round cells in a homogeneous matrix. It is no doubt a secretory product formed very much in the

same way as the egg-shell membrane in the bird's egg is formed.

Oliver has already drawn attention to the fact that gestation in the case of every woman who conceives begins at a definite and fixed time, and that that definite and fixed time is two days before the date when the missed period was expected to make its appearance. He has further stated that the full-time extrauterine fetus dies at a definite and fixed time, unless its timely delivery is effected by an abdominal section of the mother. The infant dies without a struggle and the mother is unaware of the time of its perishing. He believes that this full-time extrauterine fetus dies from lack of oxygen and of mineral substances because the limit of the duration of the functioning activity of the placenta has been reached and the cells concerned thereto have lost their selective powers. The full-time extrauterine fetus at the time of its natural death is as well nourished, as well developed and well formed as any normal uterine fetus is at the time of its birth. The author observes that still-births due to oxygen starvation are of fairly frequent occurrence, but the reactionary lowering of the vascular activity in the uterus associated therewith usually so impairs the irritability and sensitivity of the uterus that parturition may be delayed for days after the infant has perished.

The passage of all those materials which are requisite and necessary to enable the fetus to complete its development and growth, no matter where the fetus may be located, is determined and regulated by the selective powers of a vital character exercised by certain placental cells.

Chronic Ulcerative Colitis.

HUGHSON (*Virginia Medical Monthly*, August, 1923) quotes Logan's summarization of the diagnosis of ulcerative colitis as follows:

The history of an intractable diarrhea which in the large majority of cases contains blood, pus, and mucus; failure to find any parasitic or known bacterial cause in the stool; proctoscopic demonstration of involvement in the rectum and lower sigmoid; the *x*-ray pictures of the characteristic changes in the colon.

Obviously the prognosis must be a guarded one. No single therapeutic measure has been of value in all hands. When apparently cured, the disease is prone to recur, and not infrequently the individual fails to respond to any measure adopted whether medical or surgical. Complete cures are the exception. Alleviation of severe symptoms and control of any further extension should constitute our preliminary prognosis.

The basis of all the medical therapy of chronic ulcerative colitis is irrigation with antiseptic or healing solutions. Medication by mouth would hardly be considered as a possibility, though of course diet in that it changes either the consistency or reaction of the fecal material may be of benefit. Rectal and colonic irrigations have long been employed—instillations of solutions of the silver salts, silver nitrate, argyrol and protargol in mild cases which have not extended any great distance upward seem to have been of some benefit; so, too, the use of a bland, non-irritating oil which so lubricates the bowel wall that the irritative action of the fecal material is partially allayed. This oil should be retained over night if possible. Other irrigations used are solutions of the common salts, sodium bicarbonate, boric acid, potassium permanganate, hydrogen peroxide (the writer states he has seen such an irrigation cause perforation of the bowel where a large ulceration was present), quinine, and chloramine-T. The irrigations should be given in the knee-chest position with the proper precaution observed against over-distending the bowel. Yeomans considers peroxide in two-per-cent solution the best; Logan prefers argyrol, but said the best results were obtained from enemata of hot water 120° F. In one case he secured healing with complete disappearance of symptoms after four months of such treat-

ment. Bassler feels that "enemata are not apt to be helpful and are often harmful," and states: "If the bowel cannot be irrigated from above, such as by the duodenal tube, the intestinal tube of Einhorn, or by operation, it had best not be irrigated at all." Direct local treatment of individual ulcers through a sigmoidoscope is another method which is of course distinctly self-limited.

Oral medication may be said to begin with diet which in general should be such as to eliminate all irritating and highly fermentative articles and those which have any rough residue. Bassler advocates a high protein diet of the usual meats, fish, eggs, green vegetables, butter, milk, cream cheese, gelatin foods, etc. And despite the diarrheic condition, he has cured a few cases by the simple use of an anticonstipation diet of bran t. i. d. in various forms, stewed prunes, heavy molasses, petroleum, vaselin, senna leaves, and a liberal amount of water. Oil by mouth in addition to being a good tissue builder serves much the same purpose as a rectal irrigation.

An interesting procedure is that which has been used successfully by Einhorn in two cases of ulcerative colitis—that is, the Einhorn intestinal tube, by which true colonic irrigations can be given without the aid of surgery. The time consumed in passage of the tube is one week; for withdrawal three days. The treatment lasted for forty-six days. Several types of irrigations were used, the most efficacious being calcium carbonate and water 0.5: 1000 cc with 15 gtts. of ichthyol in the latter part of the drip. He also used mercurochrome one-per-cent solution 3ij q. d. for one week. The patient gained 23 pounds and was considered cured.

Surgical methods employed are appendicostomy, first suggested by Wier; cecostomy; iliostomy; Brown iliostomy and appendicostomy; iliocolostomy; resection of sigmoid and colectomy. From the first three there is little to choose, the technique of the operation is simple, the object gained from each one practically the same. Any one of these openings simply furnishes a direct means of irrigating the affected portion of the bowel with the various healing solutions, but the procedure has no effect whatever on the downward passage of fecal material other than to hasten its discharge. The usual solutions prove efficacious—potassium permanganate 1:10,000 increasing up to 1:5000, tannic acid 1 drachm to the quart, plain water and salt solution either iso- or hypertonic, all have a good effect. The stools promptly decrease in number, their character is changed, and the patient finds great relief. Little discomfort is experienced from the opening and the patient soon learns how to take care of himself. There is but slight discharge, and when the proper time arrives healing is usually spontaneous.

Going a step further is the procedure first described and advocated by Brown, of St. Louis. Payne, in an article entitled "Physiological Rest to the Large Bowel by Surgical Intervention," takes the matter up in detail. The operation consists in making a complete severance between the ilium and cecum. The stump of the ilium is brought out through the flank and the cecum is fixed to the abdominal wall and a cecostomy made. Thus the colon is entirely relieved of the necessity of functional activity, and in addition to being given a complete rest can be treated exactly as in the other types of operation. Payne says the discharge from the small intestine is not particularly irritating to the skin, and interestingly enough that in time the discharge becomes semisolid. This may possibly be a somewhat too optimistic view to hold in regard to iliostomy, as the discharge is undoubtedly irritating and certainly retains its fluid character for many weeks. After a rest period of ninety days, or however long a time is necessary to complete the healing, the ends of the bowel are sutured and the cecostomy opening closed if necessary. Payne has had excellent results in several cases. Iliocolostomy is an operation of

some difficulty and at best relieves that portion of the colon which is usually the least severely involved.

Colectomy and resection of the sigmoid are emergency measures and should only be undertaken when all hope of relieving the ulcerated condition of the bowel has been given up. This point is reached only when the colon has undergone such marked structural change that it is simply a pus-forming tube. Naturally, any such condition greatly increases the gravity of an operation which at best has a forbiddingly high mortality.

Statistics of improvements, cures and failures by the different methods advocated are of very doubtful value, as there have been so far no consistently brilliant results from any one form of treatment. Yeomans, using only appendicostomy, cured approximately the same percentage of his surgical cases as those which he treated medically and constitutionally. He had one death in nine surgical cases. Logan using all types of operations claims no cures for surgery, but reports many with marked improvement. His immediate surgical mortality was 11.8 per cent, but the variety of operations used was great and he had several colectomies. In his list Logan had seven cures in 38 patients treated medically, not by any means a brilliant showing, but quite as good as any other reported series.

Whatever unanimity of opinion there is in regard to possible benefit from the various measures suggested would seem to justify our selecting as most valuable the following: Rectal and colonic irrigation except in very early cases can hardly be a method of any great value, but should be made use of if the case can be diagnosed promptly. It represents the only means of treatment at hand for the general practitioner, and for this reason can certainly not be ignored. Diet as prescribed by Bassler and whatever oral medication seems appropriate should be given a thorough trial. The Einhorn tube, were it not for the natural hesitation one would feel in using it, is the soundest of the non-surgical procedures. It is difficult to see the value of the duodenal irrigation as advocated by Bassler, which in regard to the colon can amount to but little more than irrigation of the large bowel with dilute small intestine contents. Drinking considerable quantities of salt solution or whatever the irrigating fluid might be would probably answer the same purpose. Autogenous vaccines should be tried as their administration is easy, they cause no discomfort to the patient, and have been reported as giving beneficial results in some cases. Intravenous therapy wherever indicated should be adopted, particularly calcium chloride.

Of the surgical procedures, the Brown operation is undoubtedly the soundest from a physiological standpoint. Many patients would probably be much opposed to a fecal fistula even though assured of its ultimate closure, and under such circumstances an appendicostomy or cecostomy would be the second choice. Colectomy would be justified under the rarest circumstances.

Due to the recurrent character of the disease, a case can be regarded as cured only after complete relief of symptoms for at least a period of one year.

The prognosis should be an extremely guarded one.

Surgery of the Prostate Gland.

JUDD (*American Journal of Surgery*, August, 1923) thus concludes a paper on this subject:

Prostatic surgery has developed considerably in the last few years, due to a better understanding of the renal function and to a recognition of the importance of treatment carefully carried out preparatory to surgical interference.

Inflammatory lesions of the prostate in young men do not as a rule require surgical treatment.

Inflammatory lesions of the prostate in men past middle age should be operated on if they are causing trouble, and particularly if there are calcareous deposits in the gland.

Adenomatous hypertrophy and cancer of the prostate should be operated on by the open suprapubic operation. By this method the entire bladder can be examined and the lesion enucleated from the prostate under the guidance of the eye as well as the finger.

Radical operations for cancer of the prostate have not been satisfactory thus far. Partial operations, removing as much of the malignant condition as possible without destroying the sphincter control, have been quite satisfactory in the author's experience. Radium treatment for cancer of the prostate offers a great deal, though the end-results are not particularly gratifying.

Sacral nerve block combined with a suprapubic field block is a very satisfactory anesthesia for these cases.

Surgical Relief of Dysmenorrhea.

KENNEDY *(Minnesota Medicine,* August, 1923) holds that the surgical procedure most frequently resorted to for the relief of painful menstruation is dilatation of the cervix and light curettage of the uterus for the purpose of stimulation. This procedure gives a varying percentage of cures and relief in the hands of different surgeons, some reporting as high as 60 per cent of cures and others reporting a much lower percentage.

The next surgical procedure to be considered is dilatation and curettage plus the use of some stem pessary. Crossen recommends the Baldwin glass stem or the Dickinson hollow silver stem, both of which, when properly placed, lie entirely within the cervix. Stacy and Joseph increase their percentage of relief an additional 13 per cent by using the Baldwin stem as an addition to dilatation and curettage.

For the relief of dysmenorrhea caused by anteflexion and retroflexion, the various surgical procedures are offered where the posterior or anterior segment of the uterus is divided for the purpose of relieving the obstruction and stenosis. These uterine operative procedures are more effective when supplemented by the removal of any other contributing pathological condition which may obtain at the time: for example, inflamed appendices, cysts of the tube or ovaries, etc. Crossen warns against neglecting to remove contributory pathological conditions.

One of the most recent operations devised for the relief of dysmemorrhea caused by pathological anteflexion is that of Jacob Frank. This operation consists of splitting the posterior segment of the cervix to the internal os and hollowing out the tissue between the canal and vaginal surfaces of the cervix so that these two surfaces can be approximated readily by a continuaus suture. This operation, like that of Dudley, opens up the canal, relieving the obstruction and stenosis. Frank claims this is applicable in cases of retroflexion as well as anteflexion.

The author believes that no case of dysmenorrhea should be subjected to surgical work until careful, scientific attempts are made to relieve the condition by means of medication, glandular therapy, and the general upbuilding of the patient.

The large percentage of cases of dysmenorrhea relieved by the simple procedure of dilatation of the cervix with stimulating curettage of the uterus, justifies its being the first procedure attempted. It is many times the means of stimulating the uterus of the married woman so that she may become pregnant, pregnancy being the greatest cure of all for painful menstruation.

The relief obtained from the various operations previously described is by means of a division sufficient to overcome the obstruction and stenosis and the maintenance of that division. The principal function of the uterine suspension when added to one of these divisions is to allow the uterus to receive its blood supply unobstructed and to keep the canal free from stenosis. The advice of Graves to employ some form of uterine suspension is clinically worth following, as the author's experience has been

that where a dilatation, curettage and suspension was done no relief was obtained until the Dudley operation was performed, and in cases where a Dudley operation was performed no relief was obtained until a suspension was done.

Precancerous Skin Lesions.

SCHOLTZ *(California State Journal of Medicine,* August, 1923) observes that the same anatomic peculiarities of the skin which make for unique diagnostic opportunities offer also unique therapeutic advantages in cancer problems. Skin cancer is, unquestionably, the least dangerous clinical form of cancer and gives the best prognosis for these very reasons. It can be diagnosed earlier than any visceral variety, and it can be extirpated and destroyed without injury and destruction of the rest of the body. Both surgery and radiotherapy record most of their successes in the field of skin cancer.

The tendency of a lesion to become precancerous is brought about by the general determinant factors of cancerous degeneration. Among various hypotheses and theories of cancer causation three factors stand out as universally accepted: old age of the patient; damaged or pathologically changed structure of the tissue; chronic mechanical, chemical or biochemical irritations. The combined presence of these three factors is usually sufficient to stimulate a precancerous lesion into actual malignancy. In spite of the occasional occurrence of epithelioma in young individuals, the old adage that cancer is a disease of old age holds good. The likelihood of a lesion to turn precancerous increases with the age of the individual. Any tissue that has undergone morbid changes becomes potentially precancerous. Scars, keratoses, new growths, ulcers, various dermatoses, *x*-ray atrophic skin changes, etc., belong to this group.

The third determinant factor of cancerous degeneration—chronic irritation—is one of the best established observations. It gives us a practical and definite guidance, both in diagnosis and treatment, as to gauging the likelihood of a lesion to turn cancerous. The localization of the lesion is a matter of great importance. A wart or a nevus located so as likely to be mechanically irritated (for instance, on the face by shaving or picking, on the neck by a collar, on the scalp by a hat or comb, on the chest by clothing or stays of a corset) should be considered potentially precancerous and should be removed or destroyed. Seborrheic keratosis located on the lip and subject to the irritation by a cigar or a pipe has infinitely more chances to turn cancerous than a similar lesion on the face. The same type of lesion located out of a sphere of local irritation can be left alone, as lacking the potentiality of malignancy.

Among contributing factors of less importance should be mentioned seborrhea and actinic sun-rays.

The author emphasizes the unusual frequency of association of senile keratoses with seborrheic skin. The commonly used substitute name for senile keratoses—seborrheic warts—emphasizes this association. As to the influence of actinic sun-rays on development of skin cancer, this has been borne out strongly by clinical observations. Dubreuil in France, and Brothers and Sutton in this country, have presented figures showing that more than half of the people developing skin cancer on the face and hands are farmers, sailors, and other individuals spending a large part of their time outdoors. Hence, the term "farmer's" and "sailor's" skin is used to designate a certain type of the skin predisposed to precancerous keratoses. The practical inference is that people with florid seborrheic complexion and farmer's skin should be watched for a possible development of percancerous keratoses.

Senile keratoses are unquestionably the most frequent source of malignant degeneration and are responsible for more epitheliomata than any other type of precancerous skin lesions. A very large percentage of middle-aged and old people

carry single or multiple lesions, at times by dozens, of senile keratoses on the face and hands.

These keratoses appear as pigmented grayish-white or brownish spots or elevations, soft or harsh, smooth or scaly. Richard Sutton of Kansas City has offered on clinical and pathological grounds a very sensible classification, dividing them into three groups according to the source of their origin: First, seborrheic keratoses developing from seborrheic patches; second, nevoid keratoses springing from nevi; third, strictly keratotic type starting from the horny layer of epidermis.

These keratoses should not be considered harmless. It is true that only a small percentage of them turn malignant, but on the other hand most epitheliomata were at their incipiency just this kind of trivial looking brown spots. The most reliable clinical indication that malignancy is about to or has already set in is when lesions become rough and scaly with a persistent recurrence of a tightly adherent dry scab. The tendency to bleed and a hemorrhagic crust are rather late symptoms and should not be waited for in the diagnosis of early malignancy.

The destruction of senile keratoses can be effected in many ways: by surgical excision, chemical cauterization or electrocautery, fulguration with high-frequency spark, and by radiotherapy. The selection of the method depends on the character and localization of the keratosis, and should be strictly individualized.

Surgery is appropriate in sharply defined keratoses of seborrheic or nevoid type. Speaking generally, surgery is less applicable in senile keratoses than in any other type of precancerous lesions. Soft nevoid or seborrheic keratoses can be very neatly and thoroughly destroyed by chemical cauterization. The important principle to remember here is that cauterization must be thorough and complete or not at all. For this reason mild cauterants, such as silver nitrate, copper sulphate, etc., are distinctly contraindicated. Trichloracetic acid is very effective in this soft type, seborrheic and nevoid senile keratoses, but not in the horny variety, which acid cannot penetrate. The horny variety can be destroyed by electrocautery or by high-frequency fulguration. *X*-ray, of course, is effective and can clear up any and all types of senile keratoses. The cosmetic results are better than from any other method, with the exception of radium. Radium shares all the advantages and limitations of *x*-ray. Like *x*-ray it should be applied only in selected cases, since the majority of senile keratoses can be controlled by simpler and cheaper means.

While senile keratoses form the largest and the most important group, there are other forms of precancerous lesions of clinical interest. Among these should be mentioned leukoplakias or so-called smoker's patches. Leukoplakia patches occur in the mouth, commonly on the tongue or cheeks. Neither clinically nor pathologically do leukoplakia patches present any features of luetic nature. Besides, specific treatment has no effect whatsoever. Smoking seems to exert a striking stimulating effect on leukoplakia patches. For once the lay name "smoker's patches" is perfectly rational and expressive of etiology. Leukoplakia patches yield the best to radium or electrocautery.

Arsenical keratosis, another precancerous skin lesion of clinical interest, particularly on the palms and soles, has a strong tendency to malignancy and degenerates mostly into squamous-celled epithelioma. Patients who are taking arsenic for long periods of time should be watched for a possible development of arsenical keratosis.

Scars, particularly those following burns, should not be overlooked as potential precancerous lesions. In a series of 252 cases of squamous-celled epithelioma, Brothers of Mayo's clinic found that one-fifth of them were in the scars from burns, and to a smaller extent in scars from other causes, such as energetic cauterization or previous lesions, such as ulcers, lupus vulgaris, syphilides, etc.

Nevi occasionally undergo epithelio-

matous degeneration. In this regard pigmented melanotic nevi have a particularly bad name as producers of extremely malignant melanocarcinomata. In the author's opinion, the danger of cancer originating from pigmented nevi is greatly overrated. Among many hundreds of epitheliomata seen, the author recalls only two melanocarcinomata. The number of melanocarcinomata starting from pigmented nevi reported in literature is extremely small. It is true that patients should not irritate a pigmented nevus mechanically or by medication, but there is no valid reason why a physician should be afraid to destroy a pigmented nevus for cosmetic reasons or as a preventive measure, provided cauterization is thorough. Trichloracetic acid and fulguration are very effective in this type. Surgical excision is less desirable.

Last but not least among precancerous lesions is chronic degenerative skin changes due to *x*-ray and radium burns. The first step in this direction is the development of small discrete, horny, peg-like keratoses. The potentiality of *x*-ray burn as cancer producer is well understood by the profession at large. The dangers of radium are known much less. At present, when radium is so popular, there are more opportunities for mischief from radium than from *x*-ray. Neither radium nor *x*-ray should be used in lesions which can be cleared up by other simpler means.

Reviews

COLONIC THERAPY IN THE TREATMENT OF DISEASE. By O. Boto Schellberg. The American Institute of Medicine, Inc., New York, 1923.

We are not quite sure of the circumstances surrounding the production of this book. No medical or other degree is attached to the name of the author, nor is any title printed indicating that he is attached to any institution where large experience would qualify him as an expert. The book is unusual in that it has no preface and no introduction. Manifestly, the author's theme is inspired by enthusiasm for colonic lavage. After some preliminary matter he describes the intestinal bacteria, the anatomy and physiology of the gut, and the effect of pathology in the colon upon the general system. He then discusses what he calls "the futile enema," and describes what he thinks should be the proper technique of colonic irrigation, following this with a consideration of antiseptics and bacterial implantation, with a chapter upon fecal stasis and its consequences. There are a considerable number of illustrations, in all 23; some of them microscopic and some of them illustrating apparatus which the author thinks it advisable to use in the cases in which colonic lavage seems to be indicated. That colonic lavage has a definite field of usefulness in certain cases and that it is much overdone in others goes without saying. To many practitioners those figures showing the apparatus which can be used will prove the most interesting part of the book, as, for example, in figure 13, where in addition to the table, the basin and the irrigators, which by-the-by are grouped in a series containing three different solutions so that their contents may be given separately or together. Furthermore they are kept warm by the introduction in each of an electric bulb or one of the small stem heaters which are now employed so commonly for the warming of small quantities of water.

It having been pretty well shown by other investigators that the bacillus bulgaricus is not found when given by the mouth

in large numbers in the contents of the colon, the idea of implanting the Bacillus acidophilus by means of the colonic tube seems rational. We note with interest that the author quotes a sentence from an address delivered as long ago as 1884 by Sir Clifford Allbutt, and speaks of the so-called "abdominal woman" as one who is entangled in the net of the gynecologist, who finds her uterus, like her nose, a little to one side, or that it is as flabby as her biceps, so that the unhappy viscus is impaled upon a stem or perched upon a probe or painted with carbolic acid. The author thinks that if we substituted the word "surgeon" for gynecologist and added the appendix to uterus, the parallel would be complete.

LE SYMPATHIQUE CERVICO-THORACIQUE. Prof. Thomas Jonnesco. Masson et Cie., Paris, 1923.

Jonnesco began his work on the cervical sympathetics nearly thirty years ago and has continued it persistently ever since. Therefore his present volume detailing his views and experience in this field must take an authoritative place in surgical literature.

In the beginning Jonnesco had to show that the ablation of the cervical sympathetic ganglia in man was not followed by the dire consequences which physiologists had observed in animals, and this he readily accomplished.

His first operations were done for the cure of epilepsy and then for exophthalmic goitre, but later Jaboulay employed cervical sympathectomy for the cure of facial neuralgia. In 1897 Jonnesco first employed the operation in glaucoma, in 1900 in cases of essential migraine, and in 1916 in angina pectoris. That his enthusiasm for this method of treating these maladies has not been more generally shared by surgeons he attributes to the fact that they have not carried out the removal of all three ganglia, but have contented themselves, as he did in the beginning, with the ablation of the superior and middle ganglia. He long ago urged the removal of the inferior ganglion, as well as the other two, and showed that, owing to its close relation with the lower ganglion, the first thoracic ganglion is also removed. It was very early in his work (1896) that he urged and practiced the resection of the three ganglia. He states that it is difficult and often impossible for the surgeon to separate the lower cervical ganglion from the first thoracic, notwithstanding the fact that anatomists dissociate them. The removal of the superior and middle ganglia is fairly easy, but the inferior is so deeply placed behind the clavicle that its resection is a delicate and sometimes difficult operation.

The first chapter deals with the anatomy and physiology and is most complete.

He shows that the sympathetic anastomoses in the brain are so complete that, in order to obtain a permanent effect, the ganglia from both sides of the neck must be removed.

Attention is also called to the fact that the sympathetic supply of the thyroid gland not only accompanies the thyroid vessels, but that direct filaments enter both the gland and the capsule. To many the improvement following polar ligation in exophthalmic goitre cannot be explained by the cutting off of the blood supply, but it probably is due to the interference with the sympathetic supply.

The second chapter in the book deals with the technique and the indications for operation. It is profusely illustrated with excellent drawings and with numerous case reports. The author is a strong advocate of spinal anesthesia and uses it in all this work.

Probably the most interesting cases in the whole book are four in which sympathectomy was done for the relief of angina pectoris with apparently excellent results.

In perusing this work one is impressed with the delicacy of the operation and the fact that good results are only to be obtained when the operation is completely and thoroughly done.

Jonnesco has accomplished remarkable results, but he is careful to show that these

must depend upon a thorough familiarity with the structures concerned and a delicate technique. Therefore, any one undertaking this operation should familiarize himself with this excellent presentation of the anatomy, physiology and surgery of the sympathetics.

Besides many other illustrations there are ten beautiful plates in color depicting the anatomy of the region under discussion. J. H. G.

ANNUAL REPORT OF THE SURGEON-GENERAL OF THE UNITED STATES NAVY FOR 1923.

Under the able direction of the present Surgeon-General of the United States Navy, Dr. Stitt, the Report for 1923 possesses more than ordinary interest. Naturally it will be of more interest to those who are engaged in military medicine than to the general practitioner.

The Surgeon-General points out the difficulty in obtaining a sufficient number of medical men to fill the corps, and also the difficulty as to nurses and what used to be called orderlies. In an endeavor to fill the Medical Corps to its full complement, no less than 12,000 letters have been sent to physicians who are within the age limits for appointment and who are graduates of recognized medical schools. Dr. Stitt has also sent personal letters to each member of the senior classes of class A medical schools concerning the desirability of the Medical Corps of the Navy as a career. In an endeavor to increase the attractiveness of this service, those who have recently graduated and who have not had hospital experience are being assigned to the larger naval hospitals for one year in order to meet the requirement of a year's interneship. The present strength of the corps is 757. This is 37 less than the number for which appropriation was made. The Surgeon-General believes that some method of increasing the attractiveness of the corps will have to be taken up by Congress.

It is interesting to note that there were 41 instances of attempted suicide in the navy in 1922, and that 22 of these attempts were successful; eight of these persons having manifested more or less symptoms of mental disorder.

REVUE LES ULCERS DE L'ESTOMAC ET LE DUODENUM. By Enriquez and Durand. Masson et Cie., Paris, 1924.

This is a simple French brochure published by Masson on the subject of chronic peptic ulcer. It represents the first definite attempt that the reviewer is aware of to reconcile the Anglo-American view of peptic ulcer with the long established clinical traditions on this subject in France. These authors cannot quite make up their minds to discard the old nomenclature, and still feel that there is a definite diathesis for ulcer production, the so-called "gastrite hypersthenique" of the French. All through this little work the influence of the American and English schools is poignantly felt. In the first place, it is evident that the far greater frequency and importance of duodenal ulcer is now recognized in France, but the cardinal work in that field has been done in the great clinics of England and America. In the second place, the newer *x*-ray technique, especially the *x*-ray in series, is being appreciated as an entirely feasible and practically the only method of exactly delimiting ulcer. The weakest point in the book is the addition of the *x*-ray pictures, which are poorly selected and for the most part atypical. There is scarcely a single good photograph of a typical duodenal ulcer such as we daily see.

Many interesting and important statements occur. For instance, gastric or duodenal hemorrhage either moderate or abundant is far from being the rule in the history of ulcer; and the fact that intestinal hemorrhages occur as well with cholelithiasis (p 32). They point out the fact that it is often possible in determining the history of ulcer cases to elicit a history which clinches the diagnosis. They also point out the frequency with which other forms of hypersthenic dyspepsia parade under the ulcer picture.

The first part of the book deals with a

general discussion of the subjective symptomatology of ulcer such as is familiar to most observers on this side of the water. They claim that in the majority of cases ulcer manifests itself by the so-called "dyspepsie hypersthenique" syndrome, which after a time is punctuated by the appearance of more frequent and more persistent paroxysmal attacks, which finally translate themselves into more or less permanent changes in secretory and motor function. They give to radioscopy the procedure most capable of demonstrating the form, position, extent and character of the ulceration. Most of the discussion on the roentgenography of ulcer is confined to ulcer of the duodenum, and considerable emphasis is laid on the spastic deformities of the bulb. There is comparatively little statistical data, and the impression one gets is that this work is based on a far smaller number of observations than those of their English or American contemporaries. This little work is but one more link in the chain of evidence tending to show that the exact diagnosis of ulcer of the stomach and duodenum is an altogether practical matter. In other words, it is possible by present-day technique to exactly determine the position, form, and size of the ulceration as well as approach a differential diagnosis with a much greater degree of security. One gets the impression from this work that there is a general standardization of methods all over the world, but most important is the necessity for the practical clinician to be able to interpret the *x*-ray picture as well as reconcile the data from intubation.

M. E. R.

NEUROLOGIC DIAGNOSIS. By Loyal E. Davis, M.D. W. B. Saunders Company, Philadelphia, 1923. Price $2.

In a small book of 173 pages, including the index, the author, who is the Assistant Professor of Surgery in the Northwestern University Medical School, has placed before us what would ordinarily be considered a medical rather than a surgical volume. The chief object is to correlate symptoms with known anatomical and physiological facts, and he presents case histories for the purpose of making his text more clear. His idea is to make neurologic diagnosis more rational than it often is. There are forty-nine illustrations in black and white which help materially in elucidating the text. As a handy manual which can be turned to for immediate reference it well fills the field which its author had in mind when he prepared his MS. for the printer.

THE AMERICAN ILLUSTRATED MEDICAL DICTIONARY. By W. A. N. Dorland, M.D. Twelfth edition, revised and enlarged. W. B. Saunders Company, Philadelphia, 1923. Price $7; with thumb index, $8.

Twelve editions of this most excellent Dictionary have appeared since it first was put together by its author in 1900. It is freely illustrated and contains no less than 141 figures in colors. The text covers 1296 pages, but the paper is so well chosen as to weight that the register does not show through. Because of the flexible leather binding and the thin paper, a volume of 1296 pages is at once encyclopedic and yet a handy manual. Our readers will probably be surprised to learn that the author has found it possible to add three thousand new words. This Dictionary is always kept at hand in a near-by revolving book-case for easy reference and clear definition.

MEDICAL CLINICS OF NORTH AMERICA. The Boston Number. W. B. Saunders Company, Philadelphia, 1923.

This, the so-called Boston number of the Medical Clinics of North America, is, of course, made up of contributions from medical men practicing and teaching in that city. There are no less than twenty-six different contributors, and their words cover 1050 pages. As in previous issues, the type is of excellent size, well leaded, and therefore the volume is easily read. Almost every medical topic is discussed, from club fingers associated with congenital heart defects to the complications of diabetes; the value of low carbohydrate diet in the treatment of migraine and headache; some errors in the diagnosis of heart

disease; toxic hepatitis following salvarsan administration, etc. Our Boston colleagues have well maintained the reputation of this publication.

CLINIQUE MÉDICALE DE L'HÔPITAL BEAUJON. Ch Achard, Professeur de clinique médicale a la faculté de médecine de Paris; membre de L'Académie de Médecine. Masson et Cie., editeurs, libraries de L'Académie de Médecine, 120, Boulevard Saint-Germain, Paris.

This is a series of clinical lectures covering a wide range and exhibiting the author as an extraordinarily well-read physician. Not only is he at home in the field of internal medicine, but he has a thorough command of neurological literature. His lectures on the Millard-Gubler and Foville syndrome, on tabes supérieur, and on hemianopsia are most exhaustive. The same thing is true of the section on Graves's disease, which under the heads of fundamental and accessory symptoms, general and nutritional disturbances, pharmacodynamic reactions, diagnosis, etiology, and treatment, attains almost monographic consideration. Thus he refers to Riesman's sign, that is a bruit heard over the eyeball in certain cases of this disorder, showing he is familiar with American literature.

Many subjects of general interest receive attention; for example, erythema nodosum, a condition which the author considers a specific, quasi-contagious disease of unknown etiology; tetanus; pneumococcic meningitis; puerperal septicemia; scleroderma; rhizomelic spondylosis, etc.

It would be of advantage to clinical medicine if the author would regularly issue his lectures and articles in book form.

D. R.

INDUSTRIAL HEALTH. Edited by George M. Kober, M.D., LL.D., and Emery R. Hayhurst, A.M., M.D., Ph.D. Illustrated. P. Blakiston Sons & Company, Philadelphia, 1924.

For many years the senior editor of this volume of nearly 1200 pages has been in the front rank of those who have devoted their lives to the study and practice of hygiene. Thirty-four contributors from New York, Chicago, Boston, Columbus, London, New Haven, Newcastle-on-Tyne, Albany, Dusseldorf, etc., contribute the text. Bibliographical references of importance follow the chapters. Unlike most books it does not have a table of contents in the ordinary sense of the word, but a copious index at the close of the volume compensates for this lack. As all the contributors are already well known by the medical profession both here and abroad, the text may be considered as authoritative. The editors have also put their mark upon it. It is a volume which all physicians who are connected with industrial establishments should possess in order that their efficiency may be correspondingly increased.

THE MEDICAL RECORD VISITING LIST OR PHYSICIAN'S DIARY. William Wood & Company, New York, 1924. Price $2.

This Visiting List opens with an almanac of the last three months of 1923, a complete almanac for 1924, and the first three months of 1925. It contains in its opening pages a good deal of information in regard to weights and measures, doses of important drugs, and formulæ for making solutions for subcutaneous medication. There is also a page devoted to the writing of wills and a section considering the signs of death. Each page bears the name of a month and each column on the page the number of the day of the month. This list is of the standard size of other visiting lists and can be recommended.

MODERN METHODS IN THE DIAGNOSIS AND TREATMENT OF HEART DISEASE. By Francis Heatherley, M.D., B.S., F.R.C.S. William Wood & Company, New York, 1923. Price $2.

This book, printed in Great Britain, is "Dedicated to those who find salvation in compensatory hypertrophy and who fear a well-conducted mitral." It was undertaken at the instigation of an official in the Ministry of Pensions of Great Britain, and the author thanks Sir Thomas Lewis and Dr. John Hay for much valuable help. Its contents is divided into six chapters: the first entitled "The Old School and the New," meaning by this the difference be-

tween the views of thirty or forty years ago or more and those that are held at the present time; the second with "Abnormalities of the Heart Beat;" and then follows "A Consideration of Heart Failure," "Angina Pectoris," "Symptoms and Signs," "Prognosis and Treatment." Printed in large type and very heavily leaded it is very easily read. The book is not to be considered an exhaustive one for obvious reasons, since it covers less than 200 pages, but it contains much interesting information, and the general practitioner, who can in a few hours read it with ease, will get many helpful hints from it.

THE PHYSICIAN'S PERFECT CALL LIST AND RECORD. Thirty-eighth edition. E. G. Swift, Detroit, Michigan. Price, mail prepaid, $1.50.

As in previous years, this very convenient visiting list for physicians contains not only much blank space for the names of patients who are visited from day to day, but also has a good deal of other information to which the physician may wish to turn for a brief reference, as, for example, a table showing the differential diagnosis of the eruptive fevers, equivalent weights and measures, a percentage solution table, metric and apothecary tables, synonyms, abbreviations, antidotes, emergency measures, thermometry, and a list of doses of drugs. On the opening page there is a carefully prepared and accurate obstetrical table. We use this list constantly.

THE INTERNATIONAL CLINICS. A Quarterly of Illustrated Clinical Lectures and Articles. Edited by Henry W. Cattell, A.M., M.D. Volume IV, 1923. The J. B. Lippincott Company, Philadelphia, 1923.

It scarcely seems possible that this can be the thirty-third series of this excellent review of medical and surgical topics. There are four articles on Gastrointestinal Ulcers; three on the Diagnosis and Treatment of widely varying medical conditions; four dealing with Fever in Tertiary Syphilis; the Influence of Intercurrent Disease upon the Course of Certain Psychoses; Some Applied Pathology of Tuberculous Cervical Lymph Nodes; and Altitude Sickness the Result of Hemoglobin Deficiency. There are two articles dealing with Diseases of Children; two with Obstetrical topics, and four on Surgical problems. Otology has one article devoted to it, as has Ophthalmology. The volume closes with the Alvarenga Prize Essay of the College of Physicians of Philadelphia for the year 1923, by E. B. Heller, M.D., who has written "A Treatise on Echinococcus Disease."

A TREATISE ON ORTHOPEDIC SURGERY. By Royal Whitman, M.D., M.R.C.S., F.A.C.S. Seventh edition, thoroughly revised. Illustrated. Lea & Febiger, Philadelphia and New York, 1923. Price $9.00.

This admirable work is prefaced by a definition which should be cheerfully accepted by the sugeon. Whitman states that "orthopedic surgery is concerned with bodily mechanics, with the prevention and correction of deformity, and with the conservation of the locomotive function."

Its reason for having become a specialty is because of the time-absorbing character of the work and because of the technical difficulties that it involves. Its scope, he states, is determined by the aptitude and opportunity of those who practice it.

This seventh edition embodies these excellent qualities which have been so largely appreciated by the profession and represent revision to date and the inclusion of all real advances made in this specialty. The subject-matter is covered with singular and convincing clarity. The illustrations are excellent and in all cases supplement and strengthen the text. There has been issued no book which will better serve as a guide to the general surgeon and as a help to those who are specializing in orthopedics than this one. The general practitioner could with profit carefully study much, if not all, of the sections devoted to etiology, symptoms, and diagnosis, and much of the treatment advocated would lie well within his grasp.

The final chapter of this work is headed "Collateral Orthopedic Surgery;" its original title was "Military Orthopedics." This deals with the classification of patients who should be referred to the orthopedist; under

this classification is placed as a heading "Amputations." He considers the conditions which disqualify for active military service, especially in reference to the spine, sacroiliac and lumbosacral joints, scapulæ, and the extremities. He gives a schedule of ratings in fractures and their sequelæ, an outline of treatment of fractures with particular reference to the neck of the femur, a minute description of the abduction treatment, takes up the question of amputation, of artificial limbs, of injury to nerves, and of attitudes of election.

To the student and the practitioner, to the surgeon and the orthopedist Whitman's book is commended as giving in the clearest way, both by illustration and text, all that is best in orthopedic surgery.

Notes and Queries

Ars Longa, Vita Brevis.

In an editorial on this subject the *Boston Medical and Surgical Journal* of November 29, 1923, reminds us that a recent article in that journal by Bradford describes the course of medical education of fifty years ago when the poet-anatomist was in his flower and the Art was making its first overtures to Science. In those days a finishing year in Vienna and Berlin, in Paris and London, learning surgery from Billroth and studying pathology under Virchow, was almost a necessity to the young disciple of Æsculapius who wished to make his way and practice his profession in one of the centers of population.

The practice of medicine was then, and for some time thereafter, considered to be the logical goal of medical education, and the ultimate gain of the individual patient was the object most generally desired. In the German clinics, however, there was danger of the young seeker after knowledge losing sight of this object, for humanity was considered in the mass, the patient was somewhat of a laboratory animal, and the disease was more important than its host. In Paris, in London, and in this country a more humanitarian view obtained, and therapeusis was the keystone in the arch of which pathology was the foundation.

All knowledge is mutable, but the scenes of science, except in its fundamentals, shift more rapidly than do those of art. The engineering principles of Archimedes and the geometry of Euclid are wrought into the modern bridges that span our New World rivers, but the forms of those bridges change with each succeeding decade and each advance in scientific knowledge. The art of Greece, on the other hand, is finished and has never been surpassed. So it is with medicine. The scientific advances of which we are so justly proud, the investigations we conduct, the papers that we read, will be cast into the discard in another twenty years. Our knowledge will be antiquated or forgotten, serving only, like fallen leaves, to fertilize another season's growth.

The art of medicine, however, the understanding of our fellow man and his reactions to health and suffering, is not new and does not change so rapidly. Amid these shifting scenes we are too inclined to overvalue the novelty of each successive set, forgetting that the play was written long ago, and has remained the same despite the changing scenes and actors.

Many things are being forgotten. Let it never be said that the physician is forgetting his duty to the patient; the master his duty to the pupil.